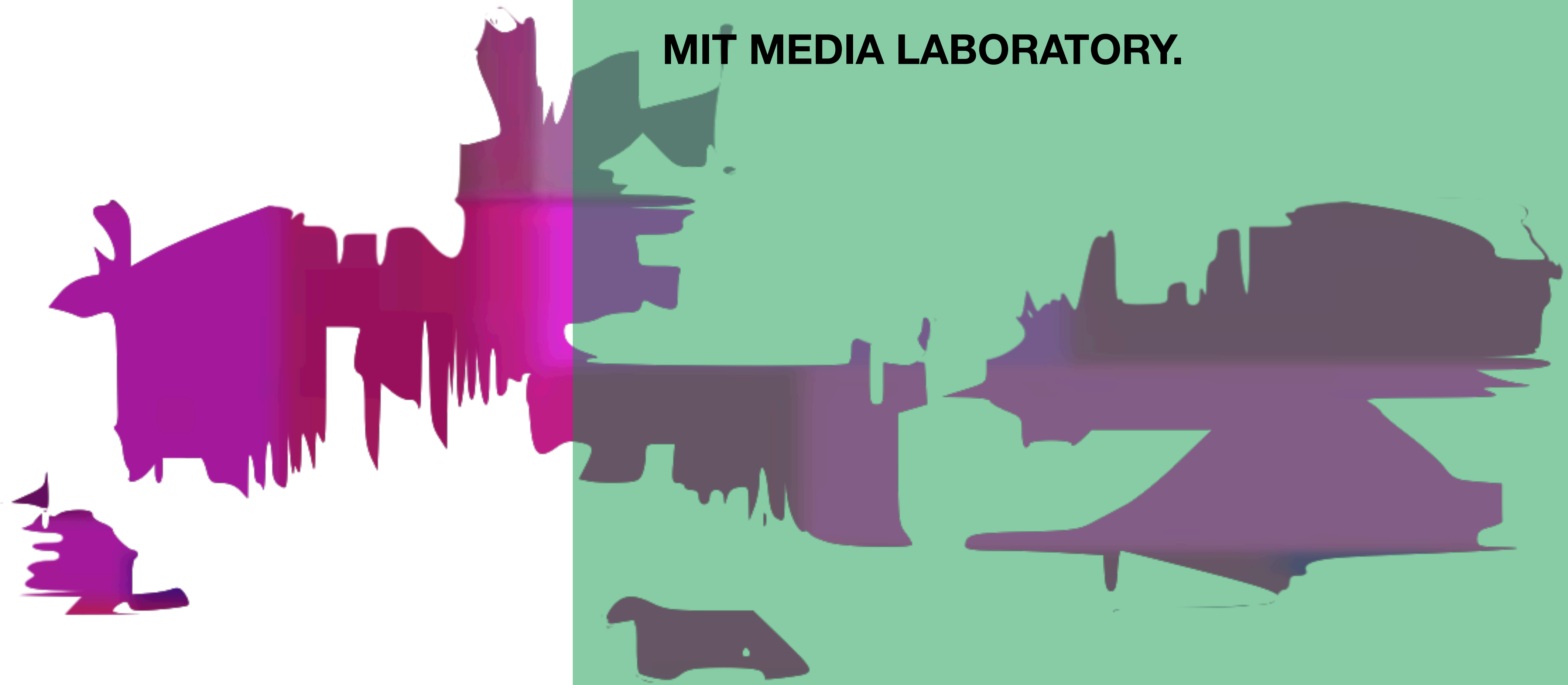
PROCESSING

MIT MEDIA LABORATORY.



Professor Frank Appiah, IEEE

Psychoperceptron

CONTENTS

1. INTRODUCTION TO PSYCHOLOGY OF IMAGE.

2. PROCESSING OF VISUAL MEMORY.

This work is done in two main parts; hypothesis development through to research design to case studies of an image in the first part of the document. The second part describes the computational perspective on graphics rendering of the psycho-experimental grouping along with the control grouping in this document. Java and Processing language is the used programming and scripting languages.

1. INTRODUCTION TO PSYCHOLOGY OF IMAGE.

Perceptron Image

Image: Hypothesis Development.

This is the only image used to do the processes of research in psychology. This is the prediction regarding the results of image research study.

The main hypothesis for this study is based on the results of related studies in visual graphics. Inductive reasoning is used in researching a question of interest. Thus is the use of specific image information, *perceptron* to make a more general prediction.

The theory-driven hypothesis is based on visual short-term memory of shapes comprising filled colours of trapezium, rectangle, and unfilled rectangle, and less-than symbol, and slanted rectangle.

Internal validity is the degree to which a study provides a good test of a causal hypothesis. The degree of *perceptron* has about 62 images to based on systematic observation and this provides about 62% good test score for causal hypothesis.

The degree to which the results of the causal study can be replicated under similar conditions is low based on systematic observation. It is about 38% and quite reliable.

Systematic Observation

Concept Definition

It is the collection of systematic behaviours in controlled tasks. Behaviour is artificial and realism is lower. It has more control over the factors in a study and increase internal validity.

It has a cognitive behaviour in nature. Tasks are presented and completed on a computer to maximise accuracy.

Operational Definition

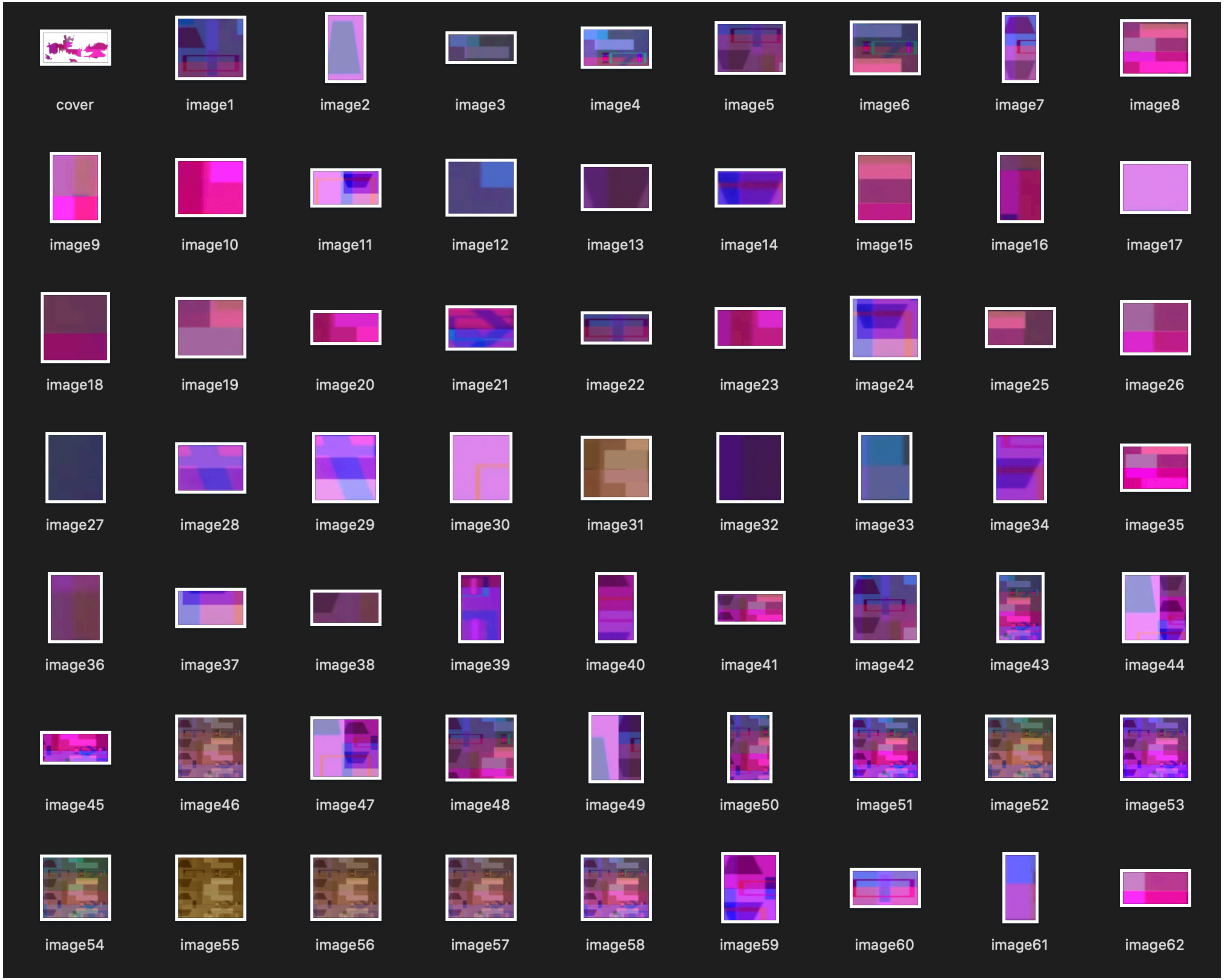
Abstract Concept

An abstract computer is used to do the manipulation of image by an editing tool. The manipulation concept is by rectangular selection and crop observation technique. This gives the measure of an abstract concept and makes it concrete for the purpose of research study. Other manipulation concept is elliptical selection.

Research Design

The variable used in the research design is numeric in nature and it is categorical so as to group individuals into different categories that can be compared. The behaviour of interest in the study is about 7 variables that is of primary interest in the research. Observation in the study constitute a stimuli response variable.

EXPERIMENT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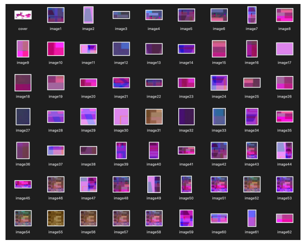
The group of participant images in an *experiment* that experience selection level of the independent variables. The *experimental group* is the selected group and the unselected group is the *control group*.

CASE STUDY

A case study is performed to gain information about artificial behaviour that is different and it is not exhibited by an individual. A case study of a group cannot be generalised to all individual.



Causal Study

Stripe Groups

Stripe 1

Stripe 2

Stripe 3

Stripe 4

Stripe 5

Stripe 6

Stripe 7

Stripe 1

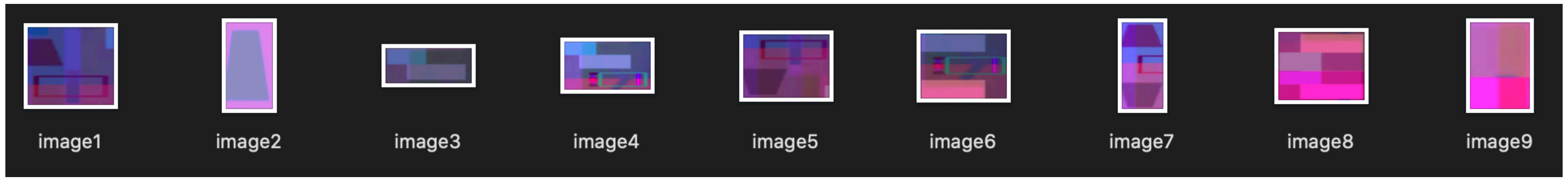

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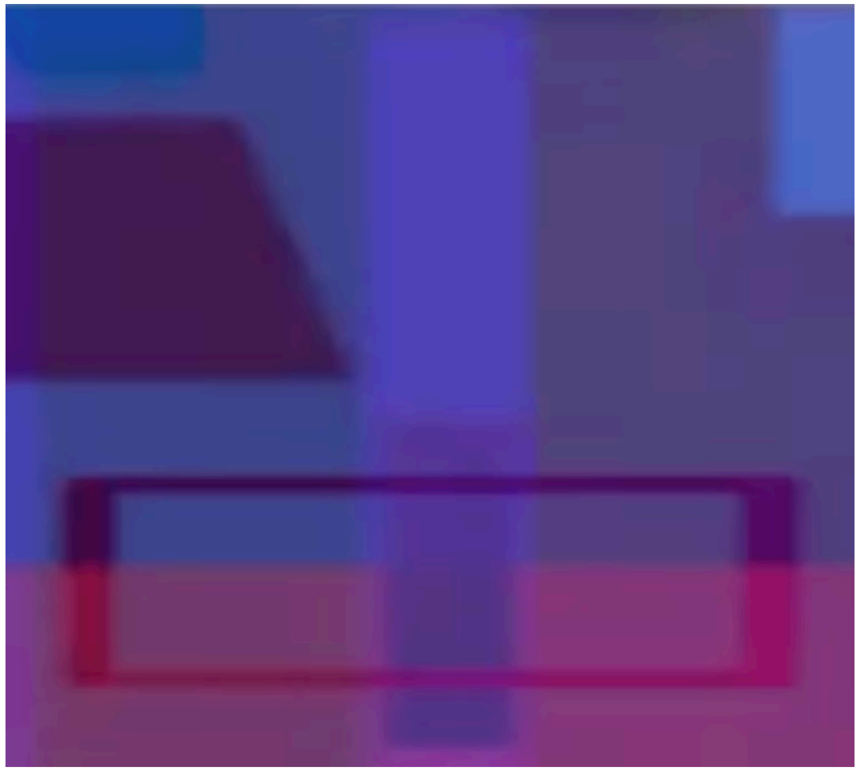
image9

There are about 9 participant images in this experimental group with its variable, 1. The case-level of participation images is from 1 to 9. The control group has 53 un-participant images that are not selected.

CASE 1: STRIPE 1

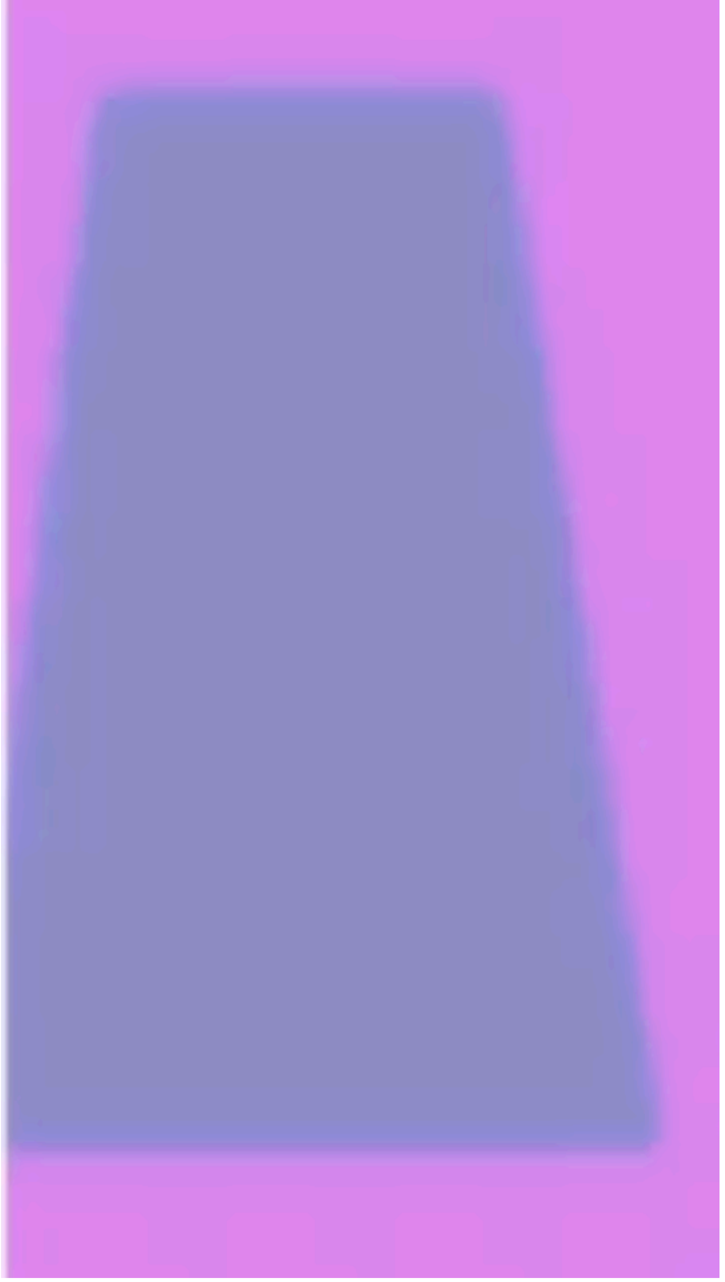
PARTICIPANT IMAGE



The behaviour is of artificial nature and the shapes that comprise the image are truncated trapezium, and rectangles (8) . It has 9 colours in total of selected shapes in the image. It has one unfilled rectangle with red colour borders.

CASE 2: STRIPE 1

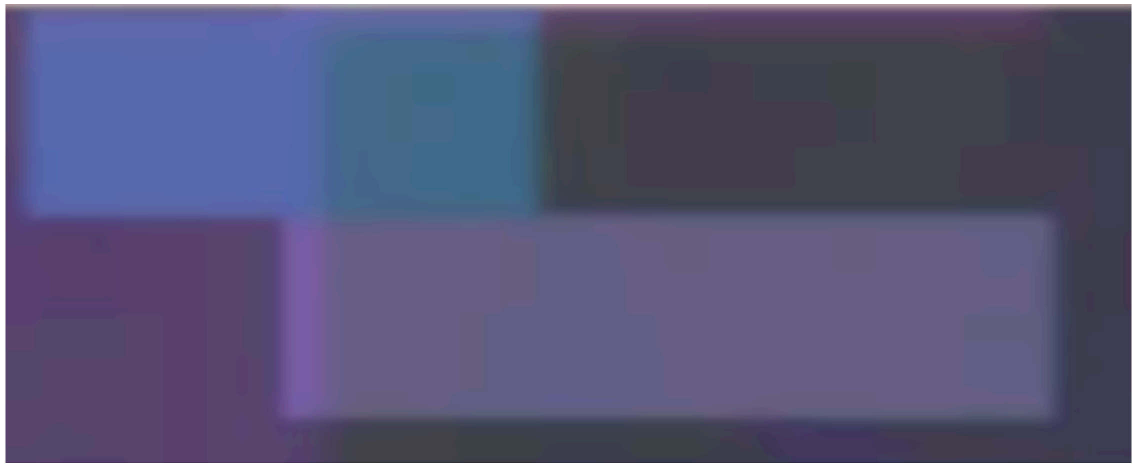
PARTICIPANT IMAGE



The behaviour is of artificial nature and the shape that comprise the image is slanted trapezium. It has 2 colours in total of selected shape and background colour of the image.

CASE 3: STRIPE 1

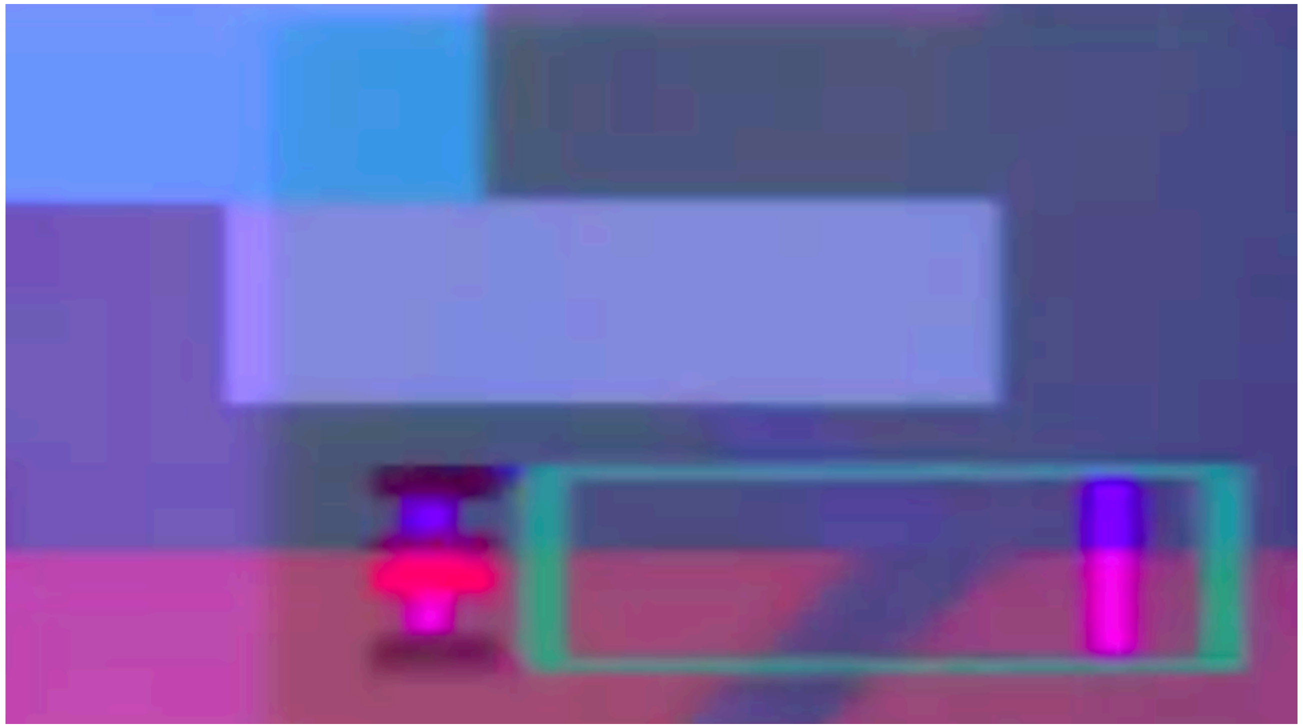
PARTICIPANT IMAGE



The behaviour is of artificial nature and the shape that comprise the image is rectangle (5) . It has 9 colours in total of selected shapes and background in the image. All rectangles are filled.

CASE 4: STRIPE 1

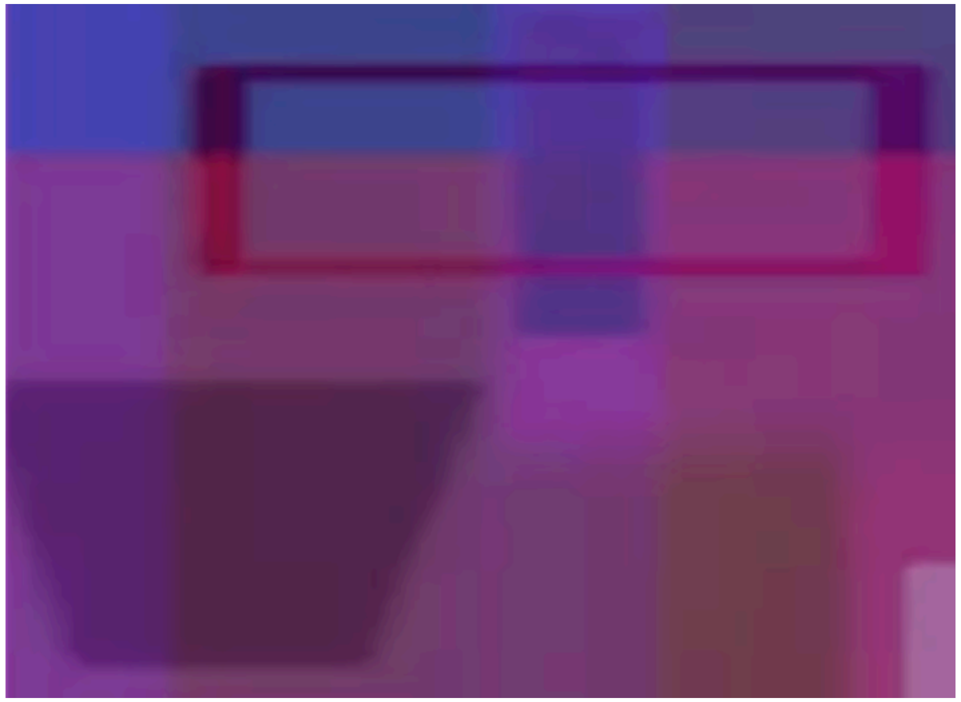
PARTICIPANT IMAGE



The behaviour is artificial in nature and the shape that comprise the image is rectangle (16) . It has 16 colours in total of selected shape in the image. It has one unfilled rectangle with green colour borders and slanted rectangle with violet.

CASE 5: STRIPE 1

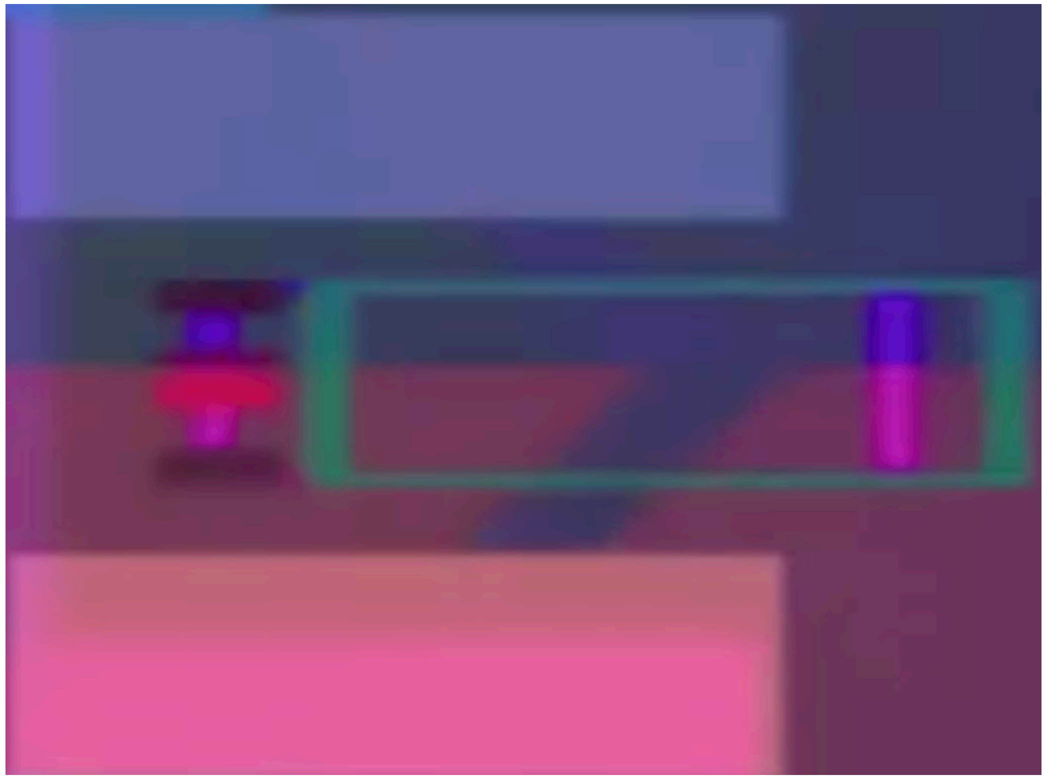
PARTICIPANT IMAGE



The behaviour is of artificial nature and the shapes that comprise the image are trapezium, and rectangles (11) . It has 10 colours in total of selected shapes in the image. It has one unfilled rectangle with red colour borders.

CASE 6: STRIPE 1

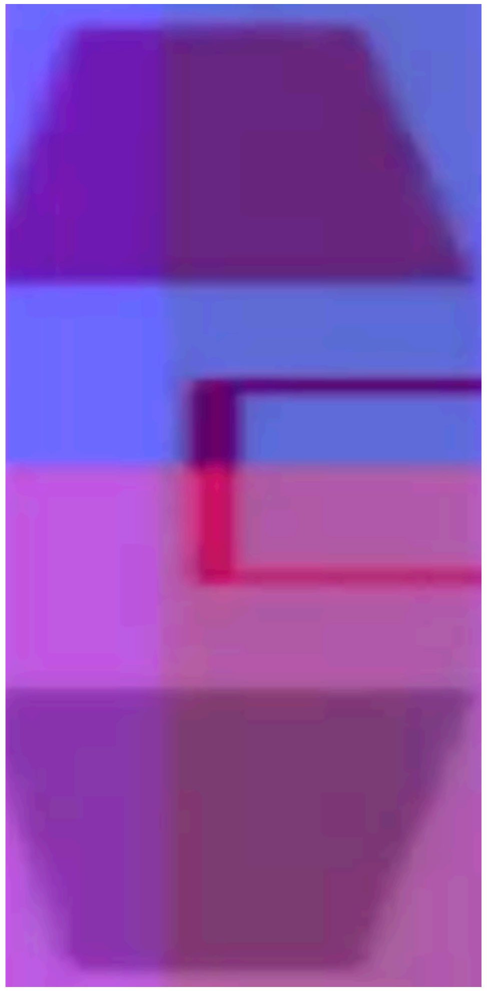
PARTICIPANT IMAGE



The behaviour is of artificial nature and the shape that comprise the image is rectangle (14) . It has 14 colours in total of selected shape in the image. It has one unfilled rectangle with green colour border and slanted rectangle.

CASE 7: STRIPE 1

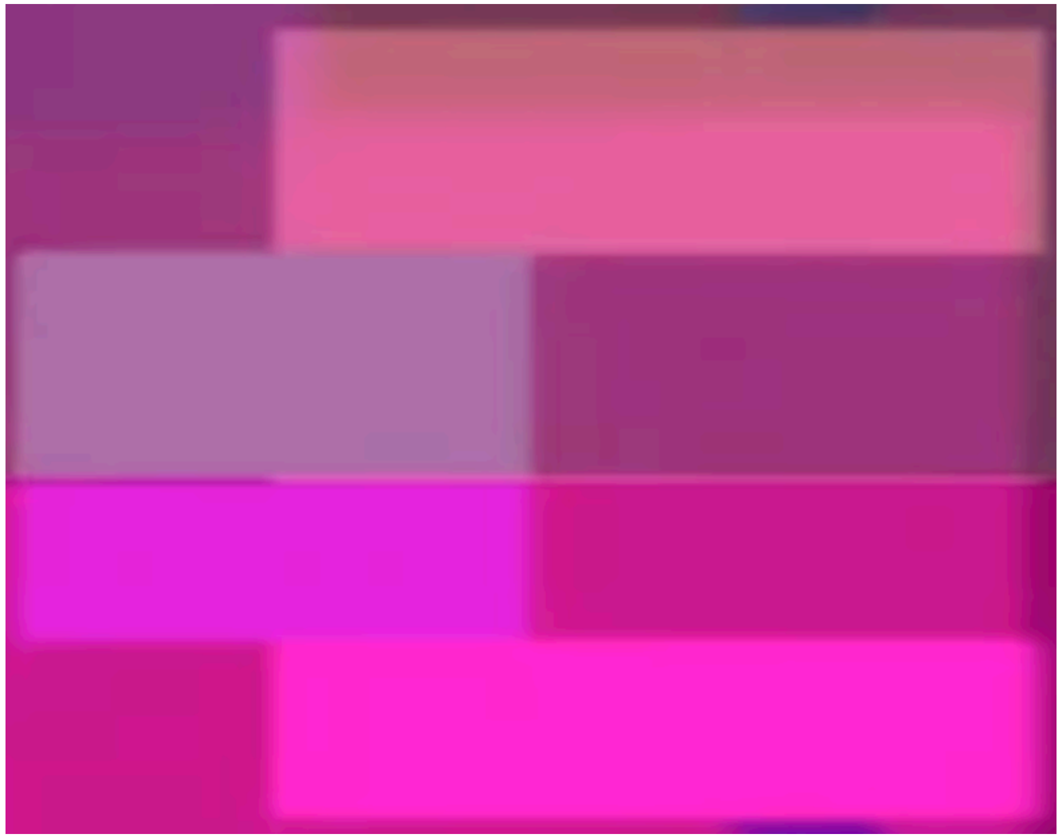
PARTICIPANT IMAGE



The behaviour is of artificial nature and the shapes that comprise the image are trapezium(2), and rectangles (5) . It has 7 colours in total of selected shapes in the image. It has one unfilled rectangle with red colour borders and a colour effect.

CASE 8: STRIPE 1

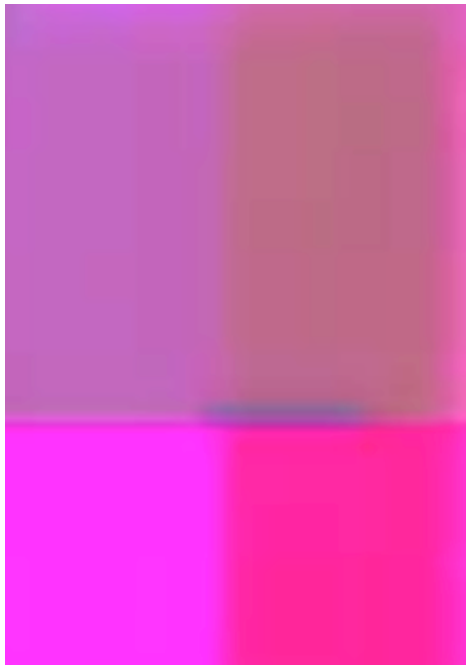
PARTICIPANT IMAGE



The behaviour is of artificial nature and the shape that comprise the image is rectangles (8) . It has 9 colours in total of selected shapes in the image.

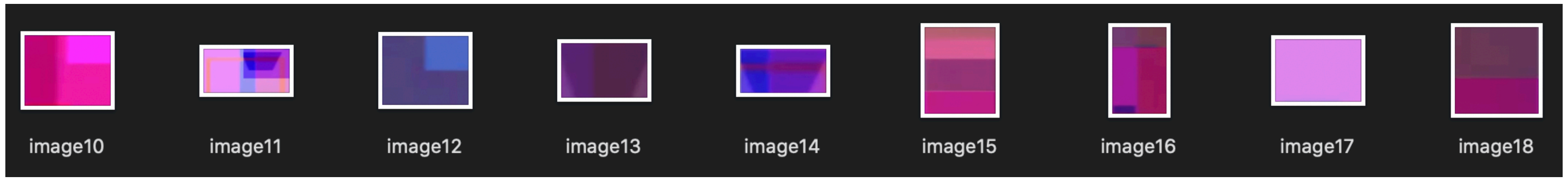
CASE 9: STRIPE 1

PARTICIPANT IMAGE



The behaviour is of artificial nature and the shape that comprise the image is a rectangle (4). It has 5 colours in total of selected shape and background colour in the image.

Stripe 2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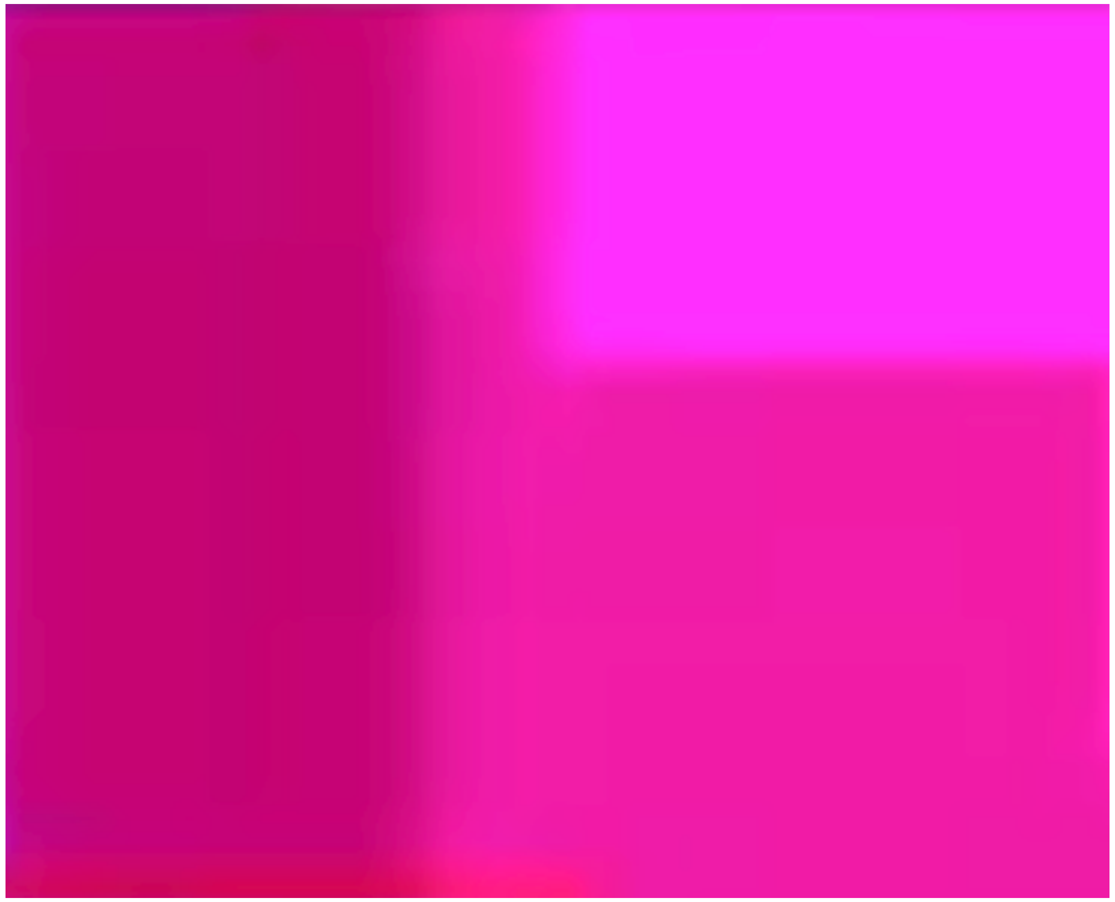
There are about 9 participant images in this experimental group with its variable, 2. The case-level of participation images is from 10 to 18. The control group has 53 un-participant images that are not selected.

CASE 1: STRIPE 2

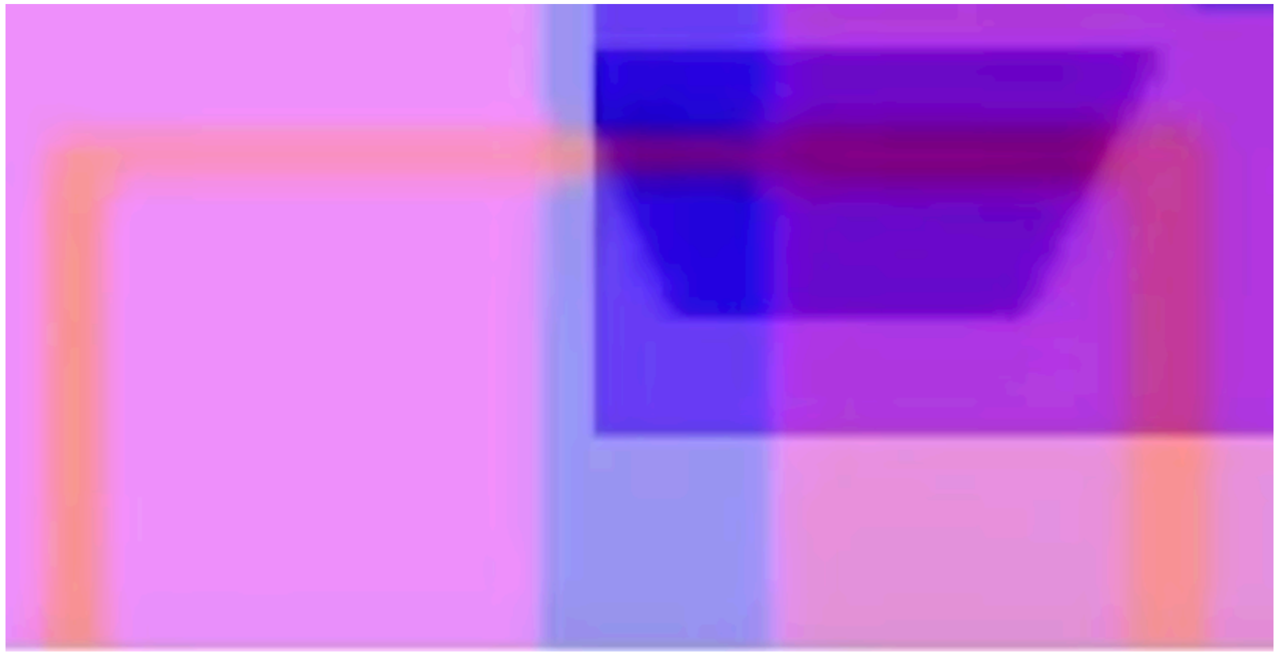
PARTICIPANT IMAGE



The behaviour is of artificial nature and the shape that comprise the image is rectangle (3) . It has 3 colours in total of selected shape in the image.

CASE 2: STRIPE 2

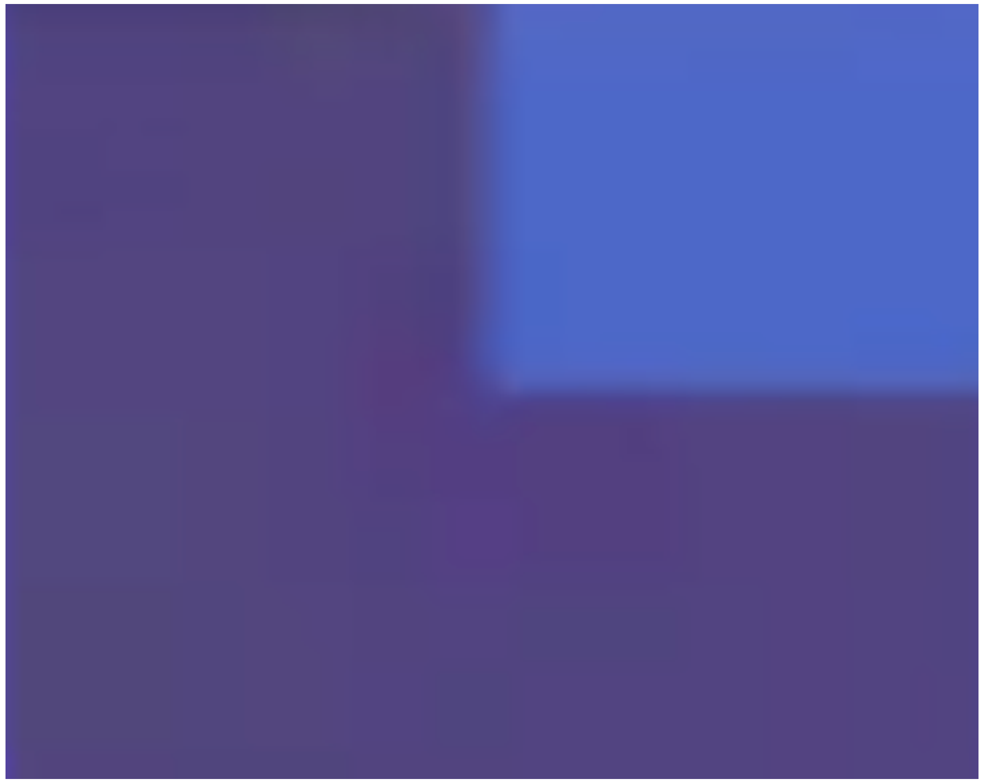
PARTICIPANT IMAGE



The behaviour is of artificial nature and the shapes that comprise the image are trapezium and rectangles (3) . It has 4 colours in total of selected shapes in the image. It has one unfilled rectangle with yellow colour borders.

CASE 3: STRIPE 2

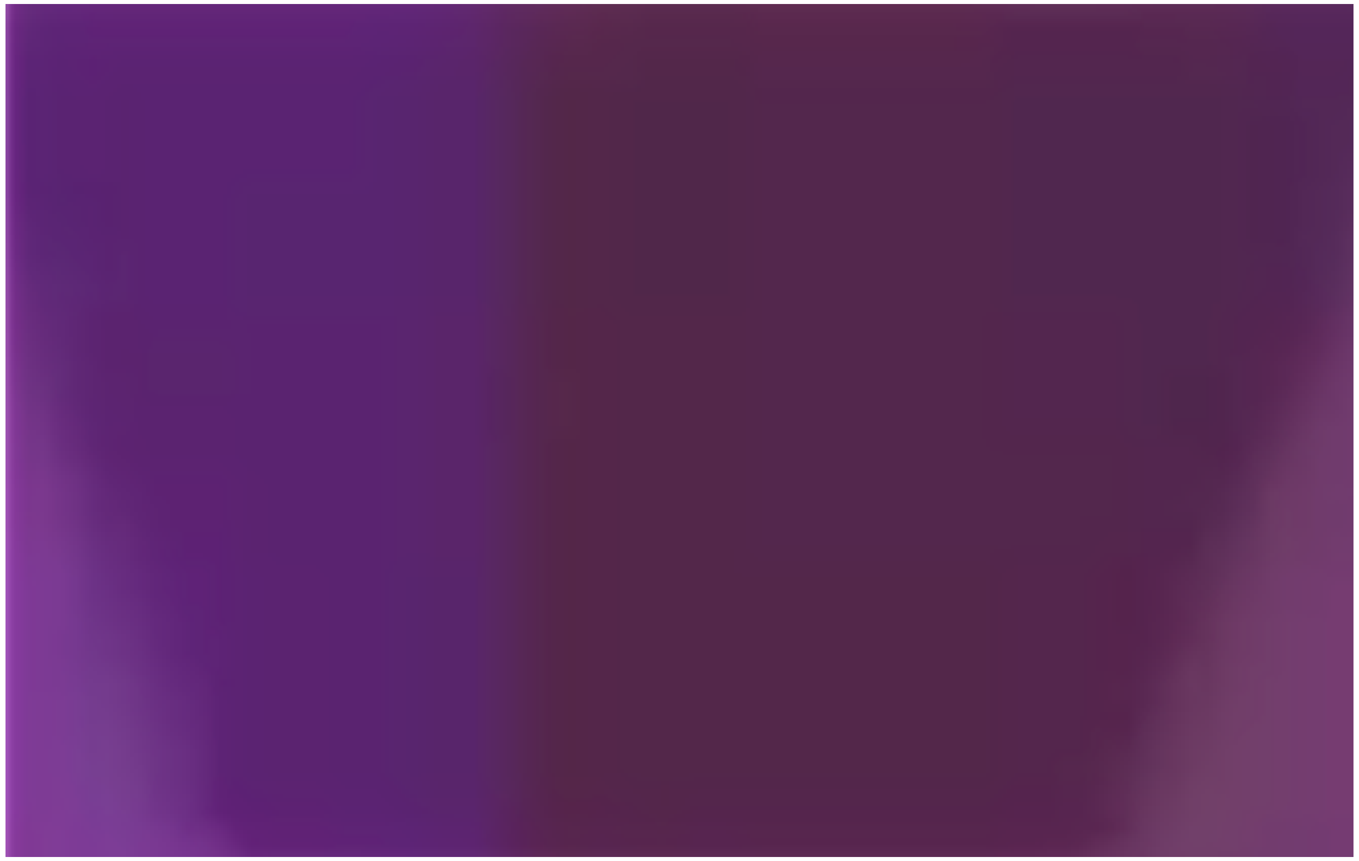
PARTICIPANT IMAGE



The behaviour is of artificial nature and the shape that comprise the image is rectangle (1) . It has 2 colours in total of selected shape in the image.

CASE 4: STRIPE 2

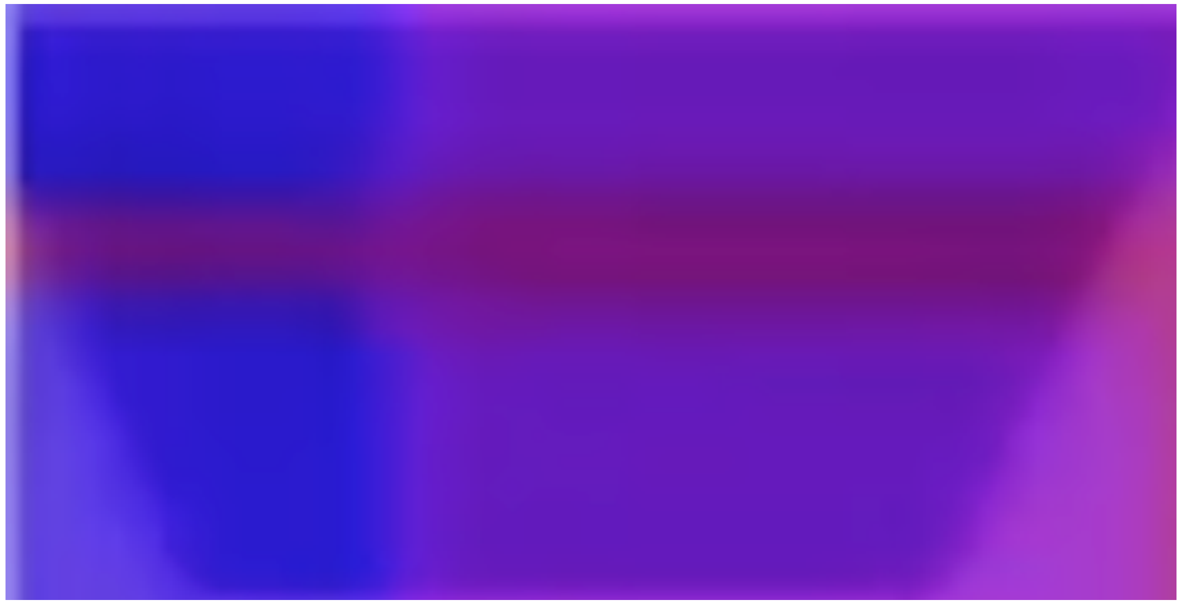
PARTICIPANT IMAGE



The behaviour is of artificial nature and the shape that comprise the image is truncated trapezium. It has 2 colours in total of selected shape in the image.

CASE 5: STRIPE 2

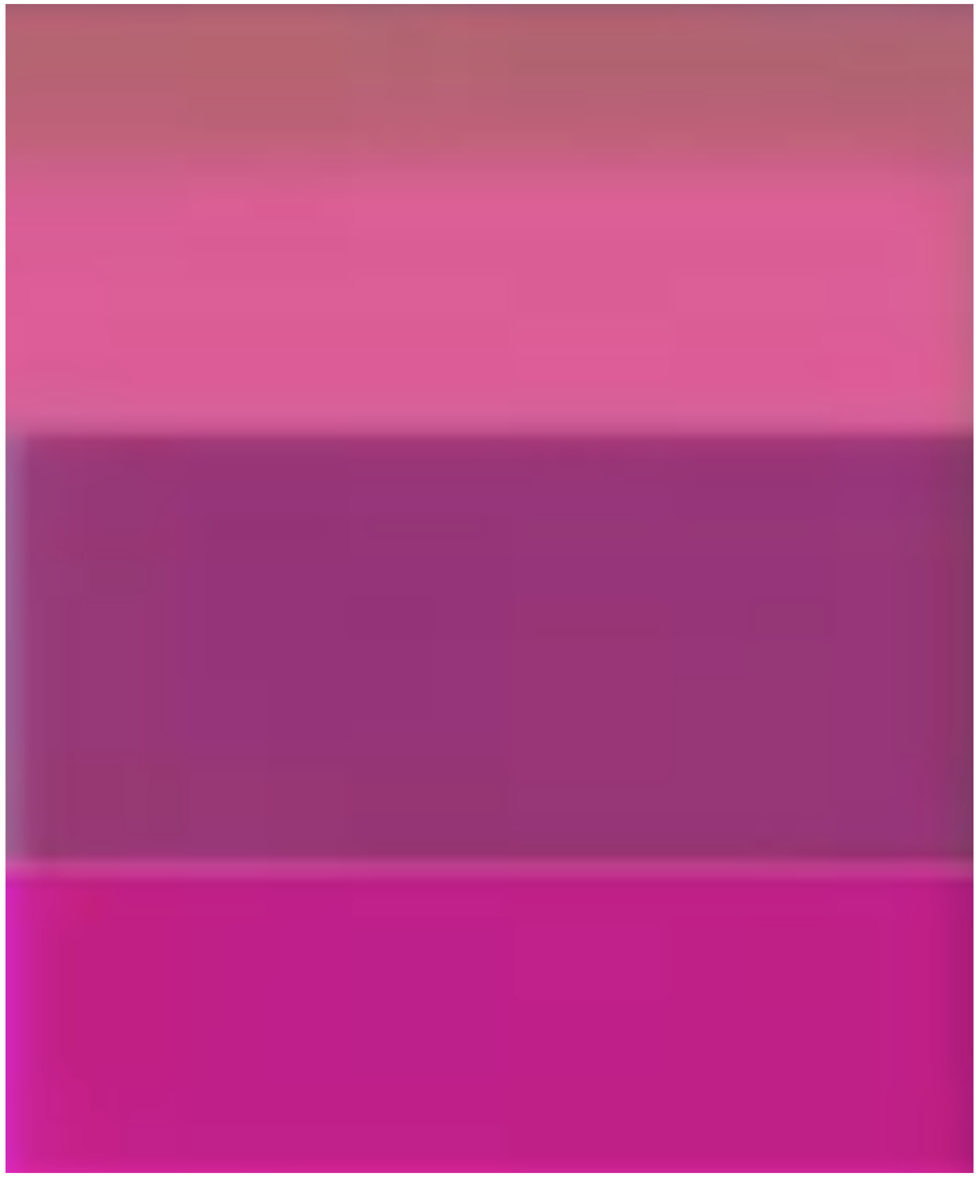
PARTICIPANT IMAGE



The behaviour is of artificial nature and the shape that comprise the image is truncated trapezium, and line . It has 4 colours in total of selected shapes in the image.

CASE 6: STRIPE 2

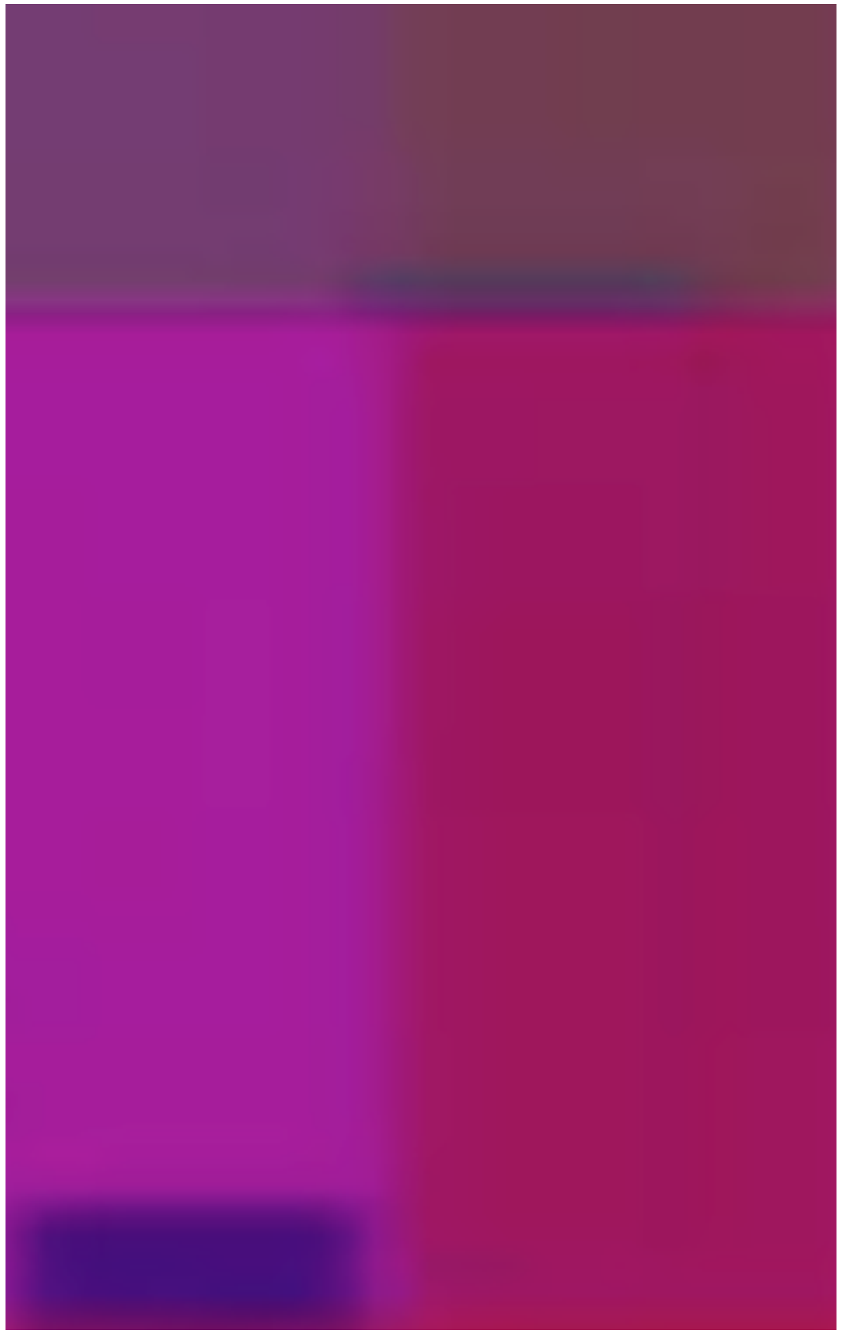
PARTICIPANT IMAGE



The behaviour is of artificial nature and the shape that comprise the image is rectangle(3) . It has 3 colours in total of selected shape in the image.

CASE 7: STRIPE 2

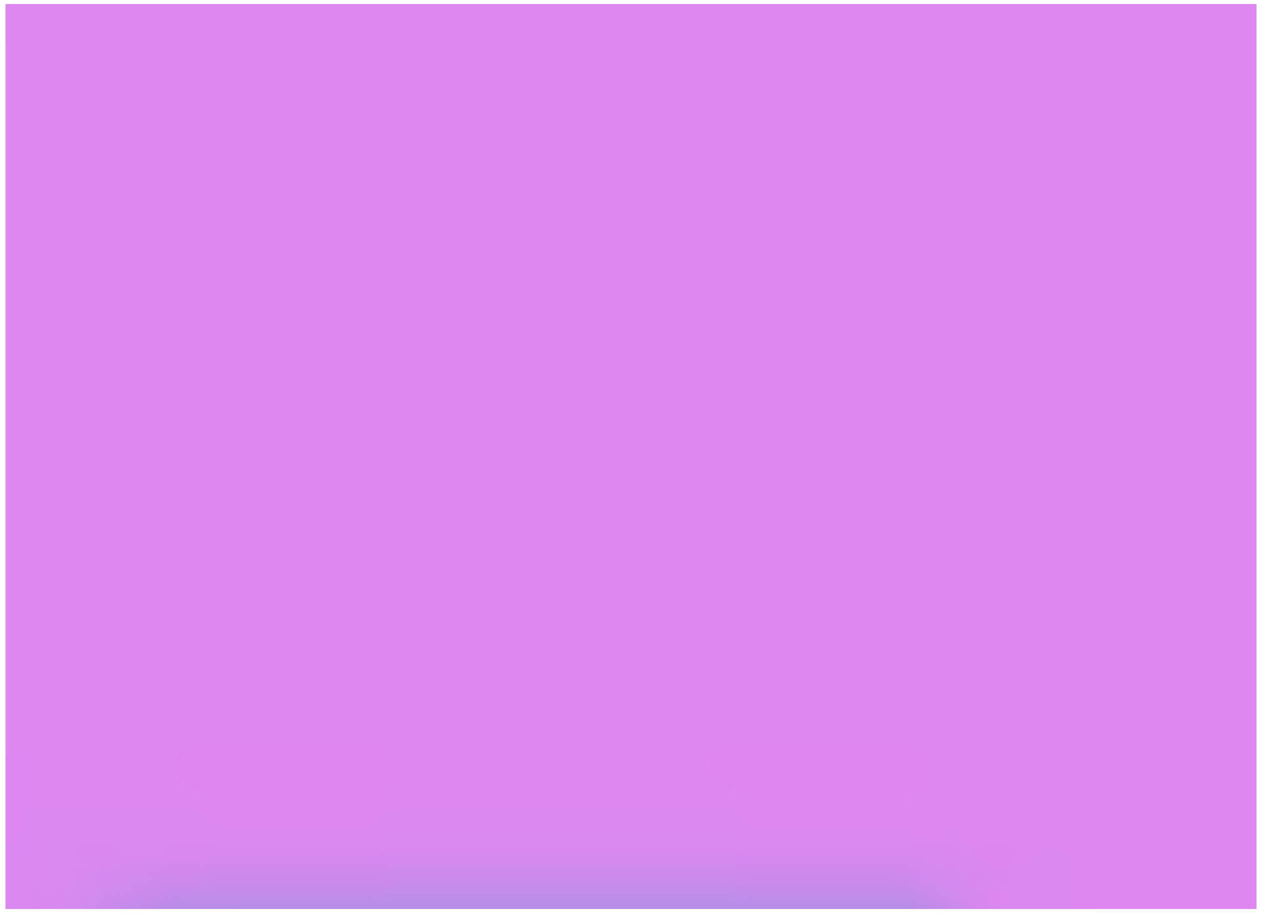
PARTICIPANT IMAGE



The behaviour is of artificial nature and the shape that comprise the image is rectangle (5) . It has 5 colours in total of selected shape in the image.

CASE 8: STRIPE 2

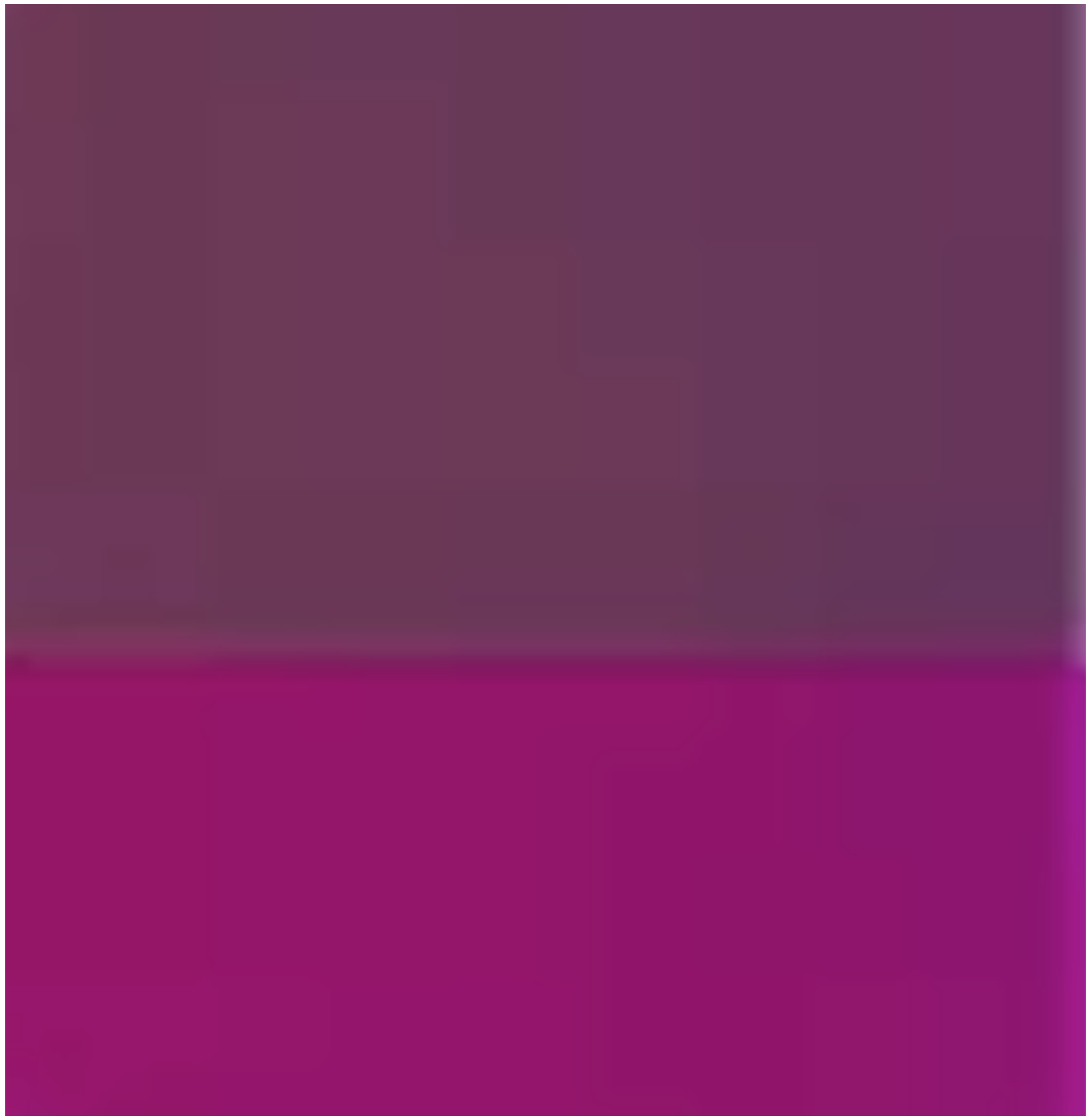
PARTICIPANT IMAGE



The behaviour is of artificial nature and the shape that comprise the image is rectangle (1) . It has 1 colour in total of selected shape in the image which is pink.

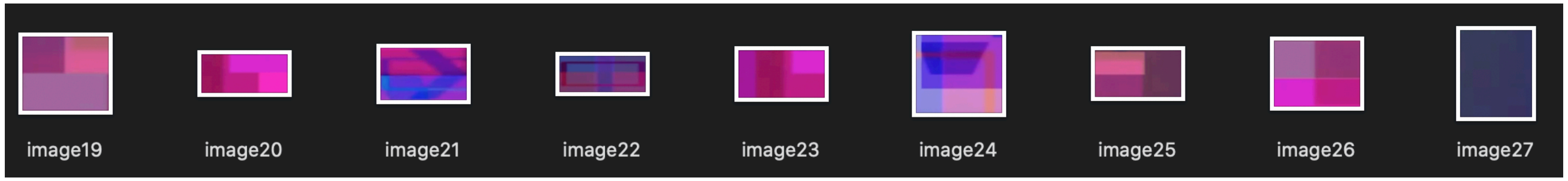
CASE 9: STRIPE 2

PARTICIPANT IMAGE



The behaviour is of artificial nature and the shape that comprise the image is rectangle(2) . It has 2 colours in total of selected shape in the image.

Stripe 3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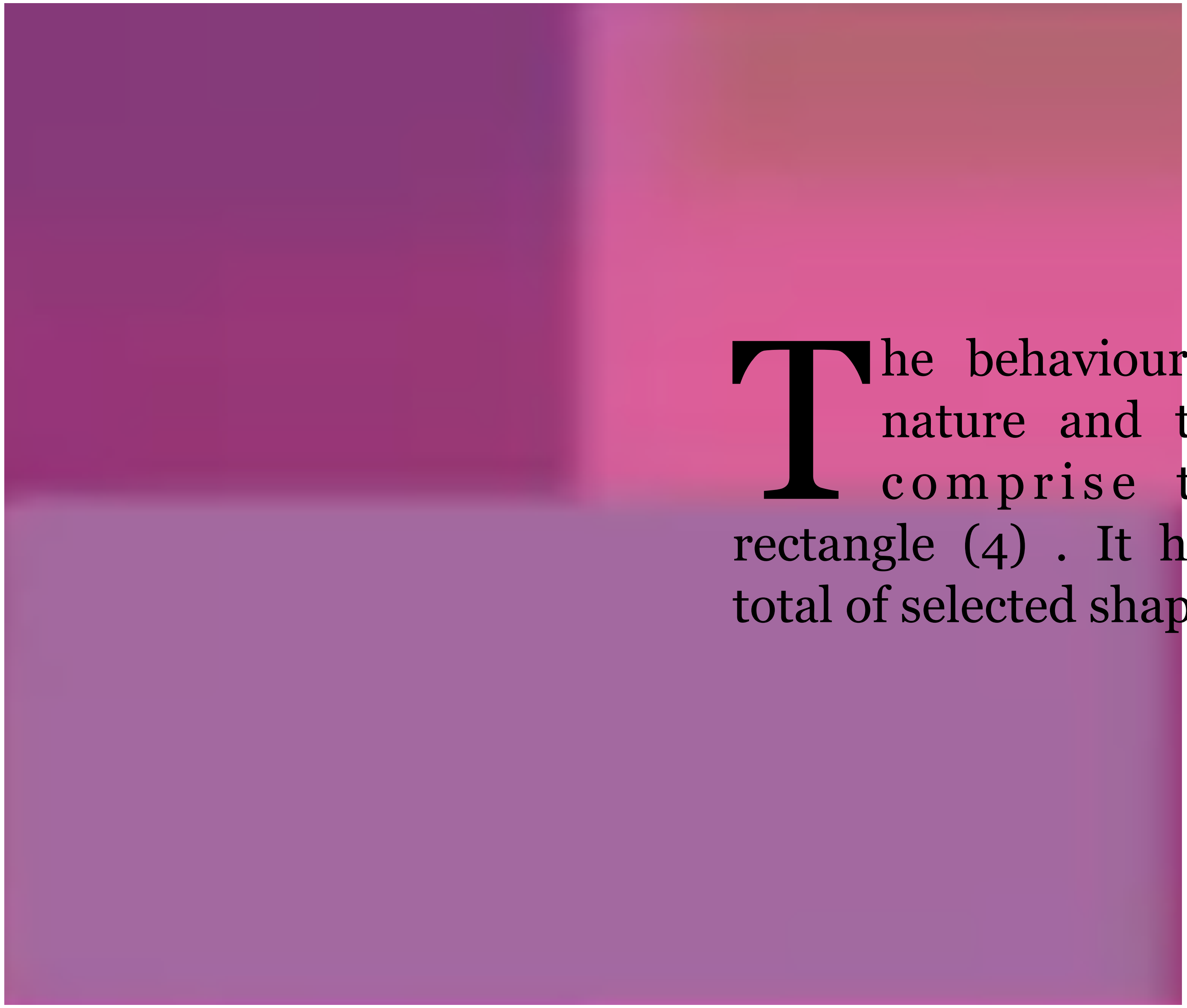
There are about 9 participant images in this experimental group with its variable, 3. The case-level of participation images is from 19 to 27. The control group has 53 un-participant images that are not selected.

CASE 1: STRIPE 3

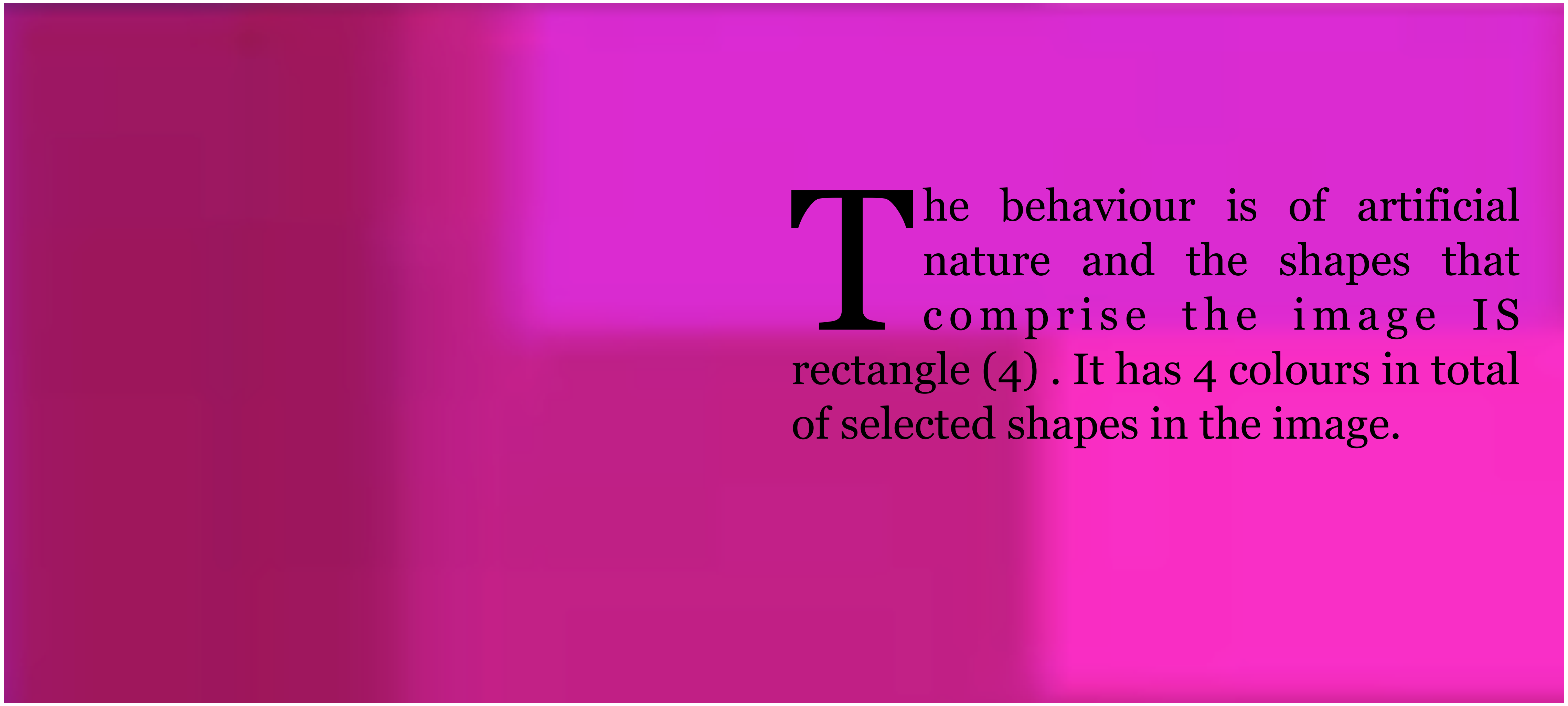
PARTICIPANT IMAGE



The behaviour is of artificial nature and the shapes that comprise the image is rectangle (4) . It has 4 colours in total of selected shape in the image.

CASE 2: STRIPE 3

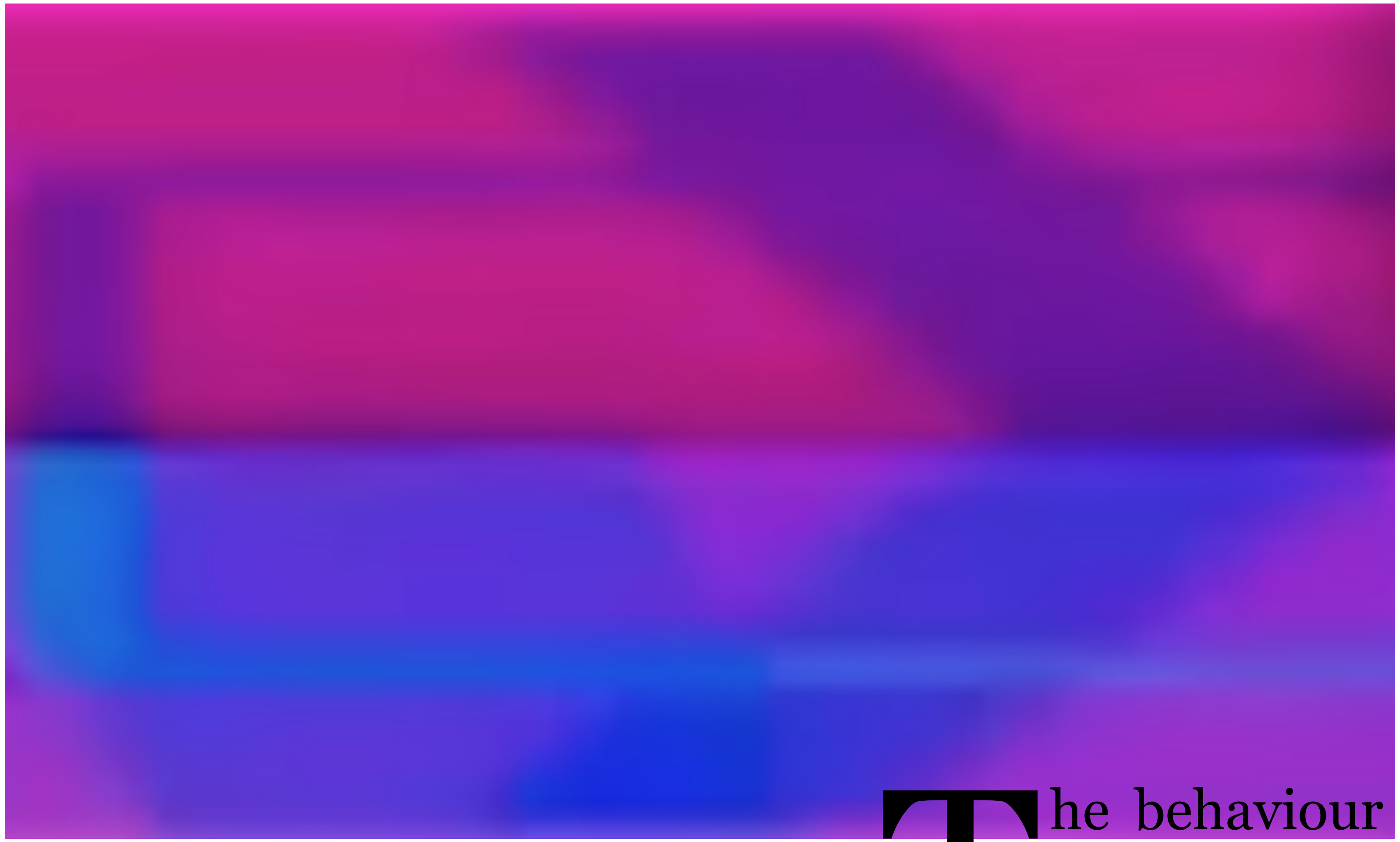
PARTICIPANT IMAGE



The behaviour is of artificial nature and the shapes that comprise the image IS rectangle (4) . It has 4 colours in total of selected shapes in the image.

CASE 3: STRIPE 3

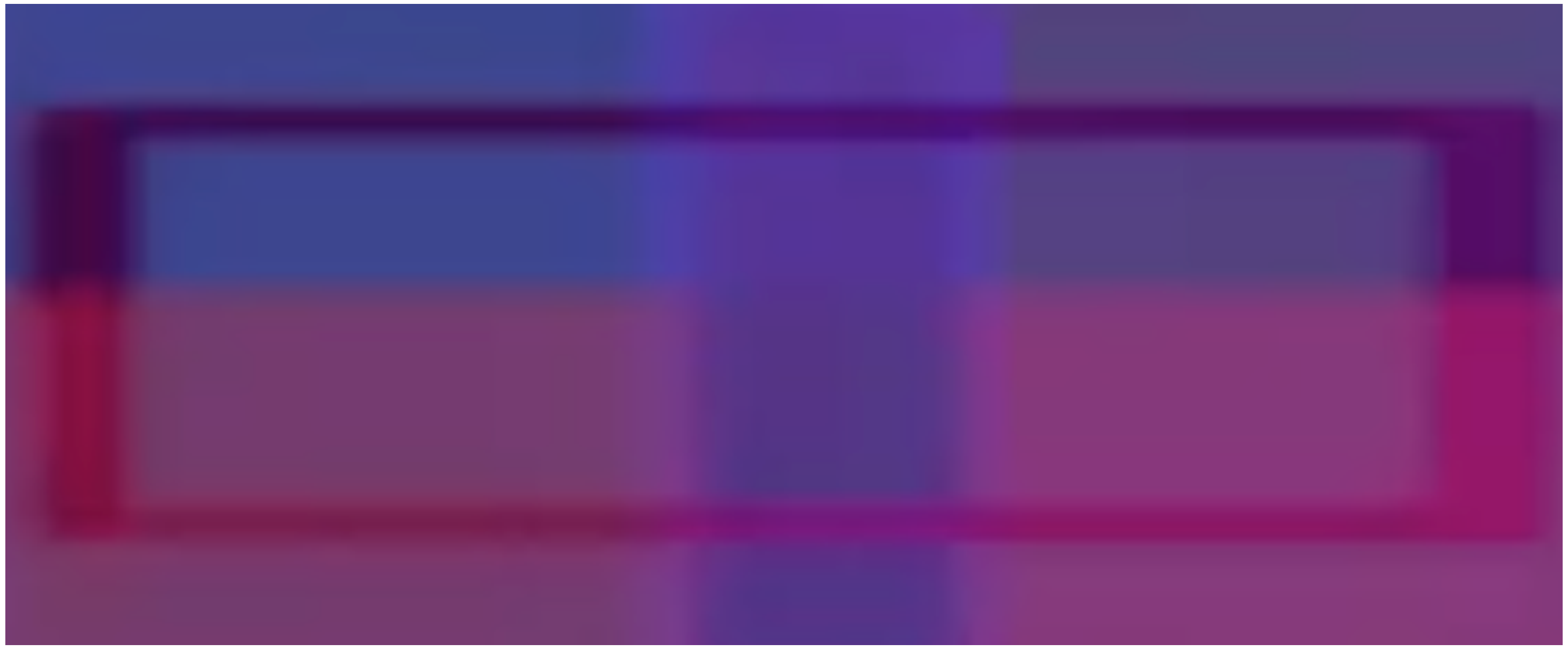
PARTICIPANT IMAGE



The behaviour is of artificial nature and the shapes that comprise the image are greater-than symbol, unfilled rectangle (1) and slanted rectangle. It has 4 colours in total of selected shapes in the image.

CASE 4: STRIPE 3

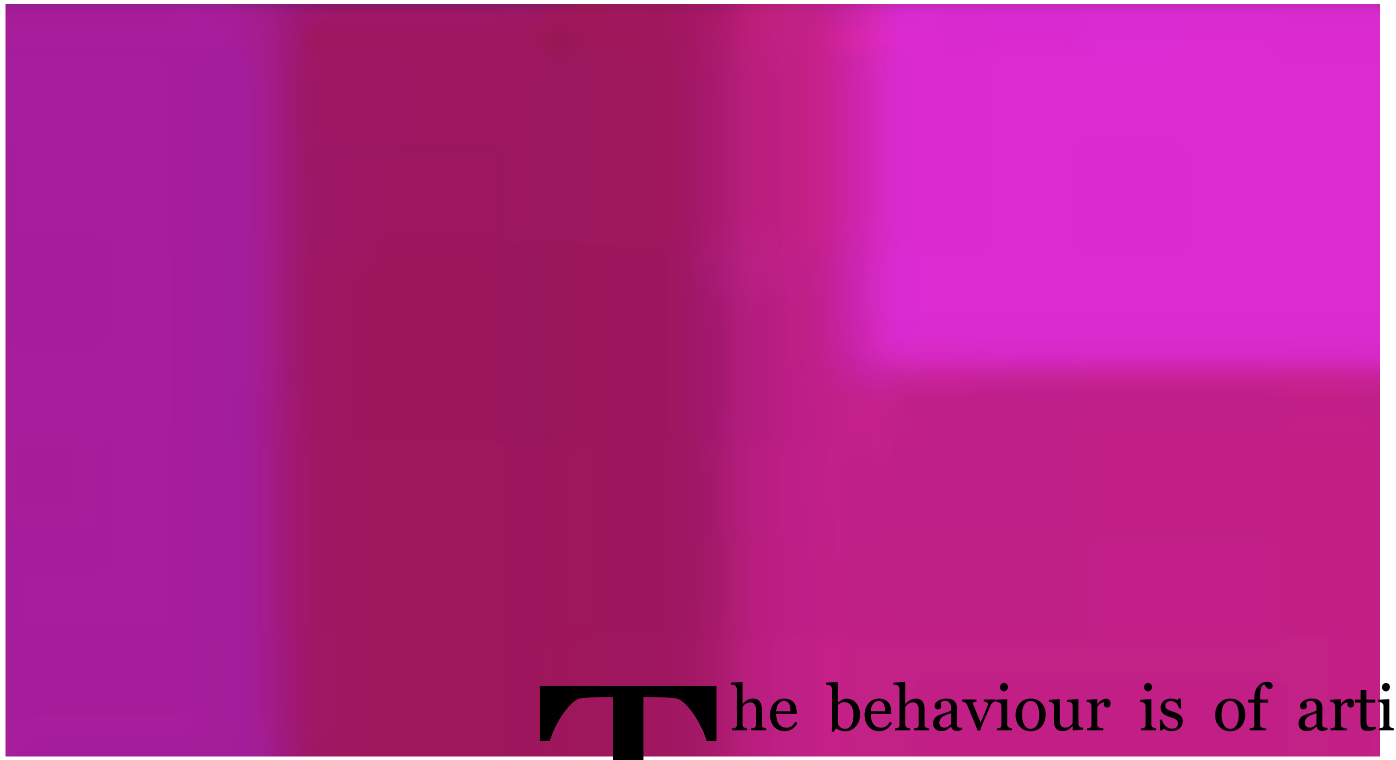
PARTICIPANT IMAGE



The behaviour is of artificial nature and the shape that comprise the image is rectangle (5) . It has 5 colours in total of selected shape in the image.

CASE 5: STRIPE 3

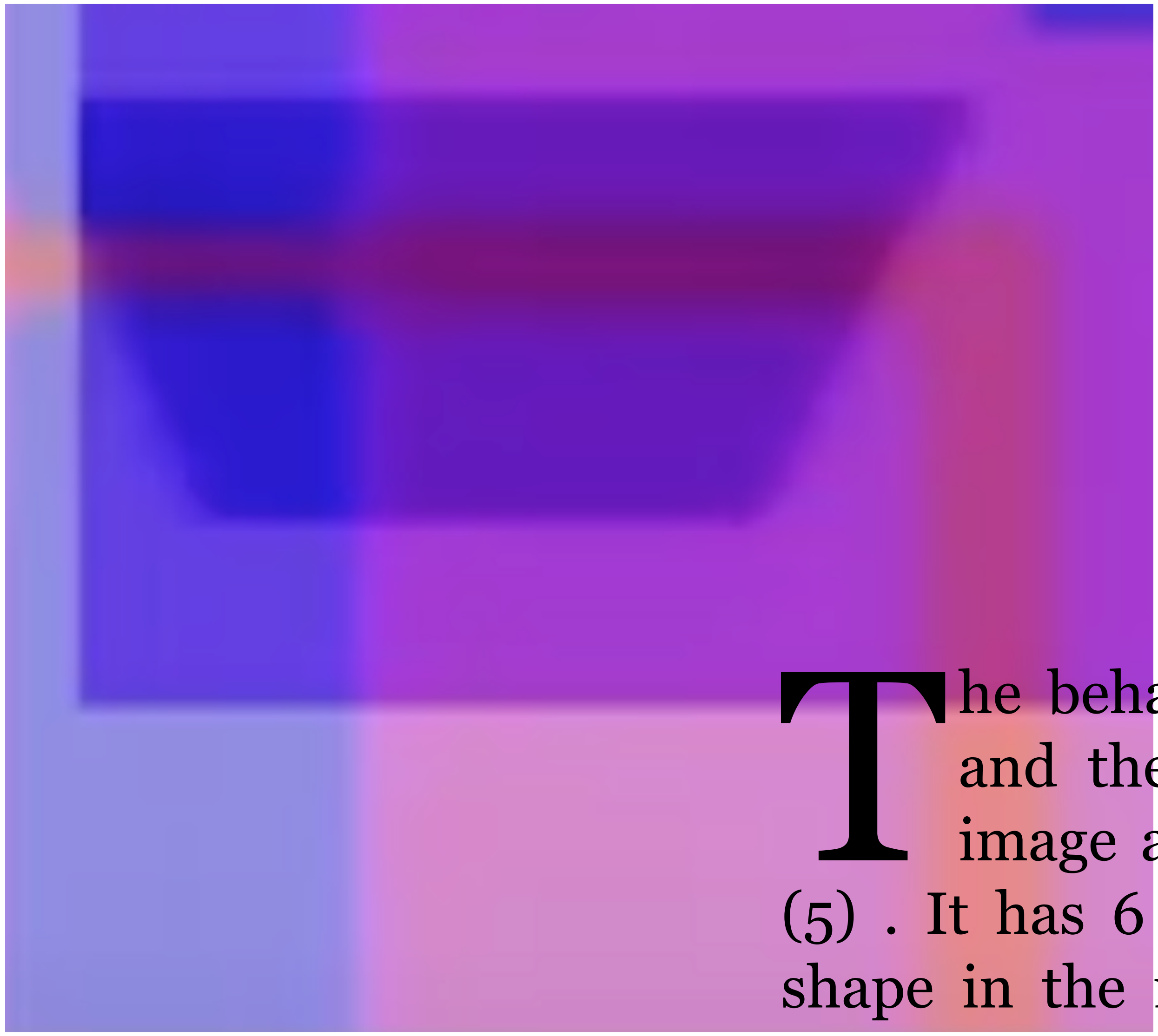
PARTICIPANT IMAGE



The behaviour is of artificial nature and the shape that comprise the image is rectangle (4) . It has 4 colours in total of selected shape in the image.

CASE 6: STRIPE 3

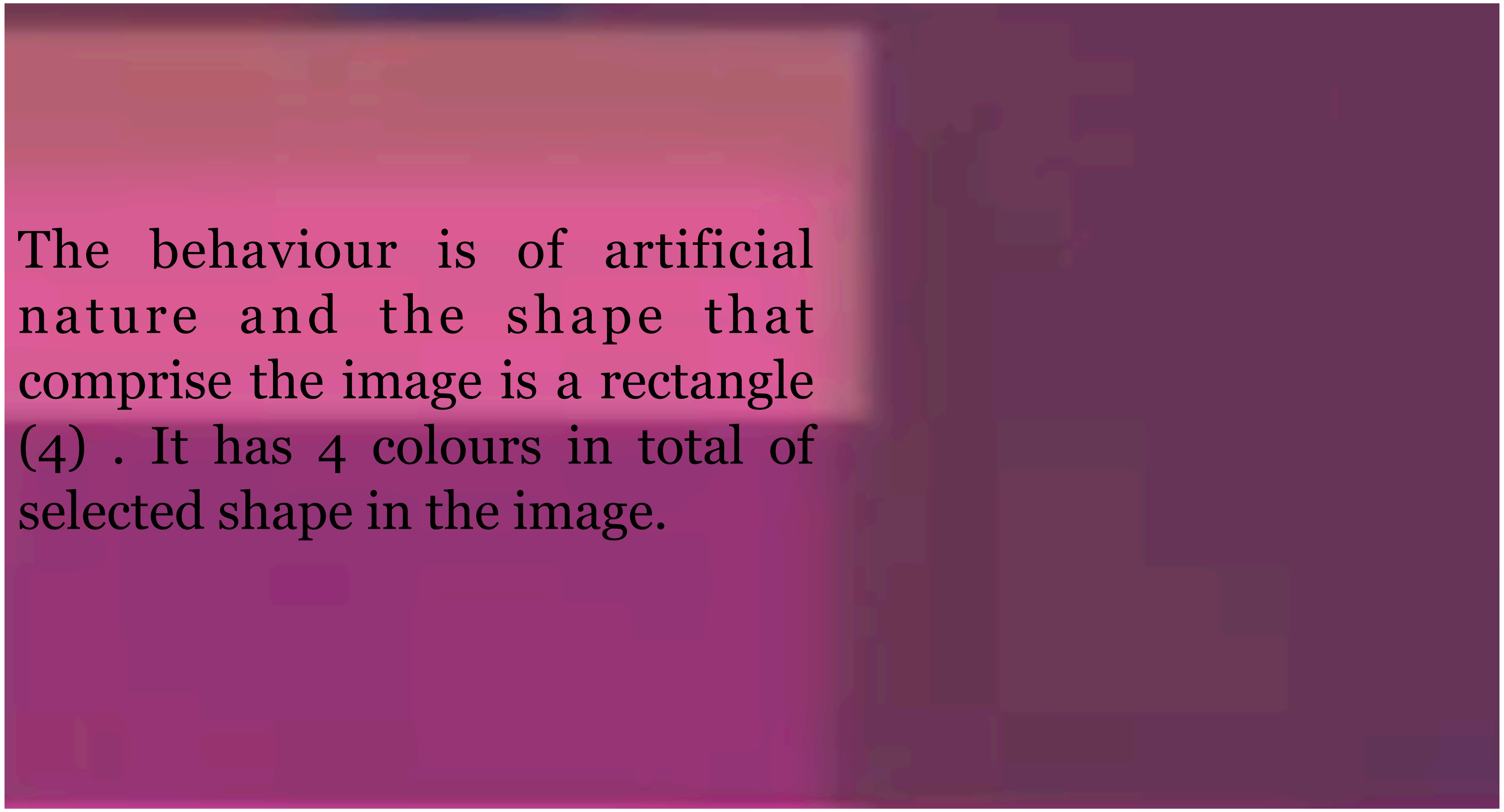
PARTICIPANT IMAGE



The behaviour is of artificial nature and the shapes that comprise the image are trapezium and rectangle (5) . It has 6 colours in total of selected shape in the image. There is an unfilled rectangle of brown colour.

CASE 7: STRIPE 3

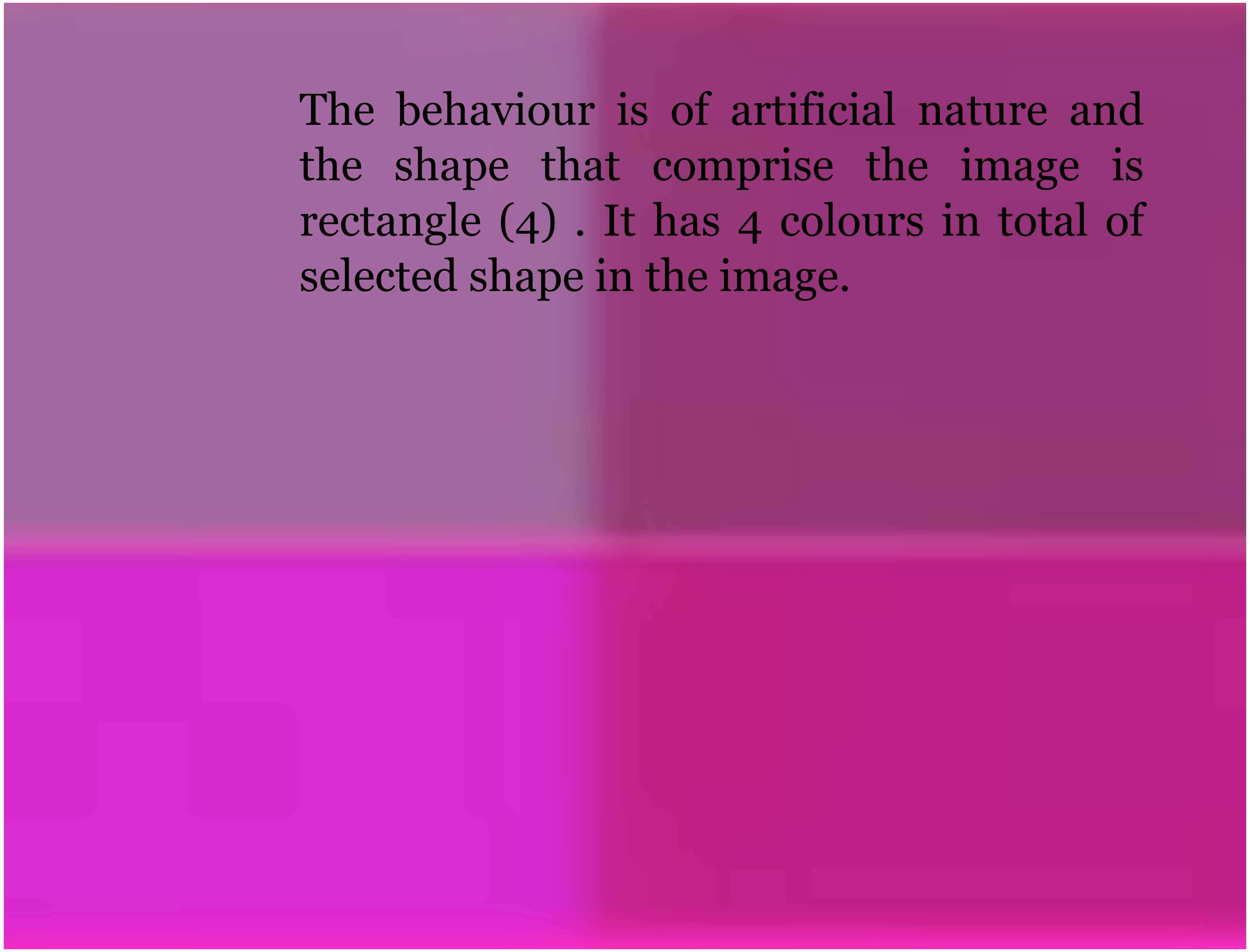
PARTICIPANT IMAGE



The behaviour is of artificial nature and the shape that comprise the image is a rectangle (4) . It has 4 colours in total of selected shape in the image.

CASE 8: STRIPE 3

PARTICIPANT IMAGE



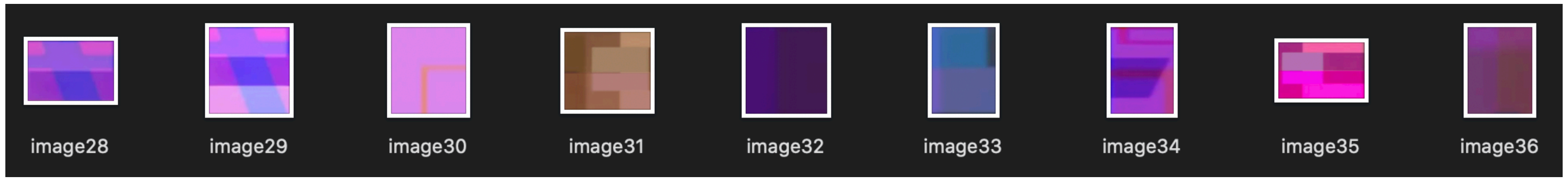
The behaviour is of artificial nature and the shape that comprise the image is rectangle (4) . It has 4 colours in total of selected shape in the image.

CASE 9: STRIPE 3

PARTICIPANT IMAGE

The behaviour is of artificial nature and the shape that comprise the image is rectangle (1) . It has 1 colour in total of selected shape in the image.

Stripe 4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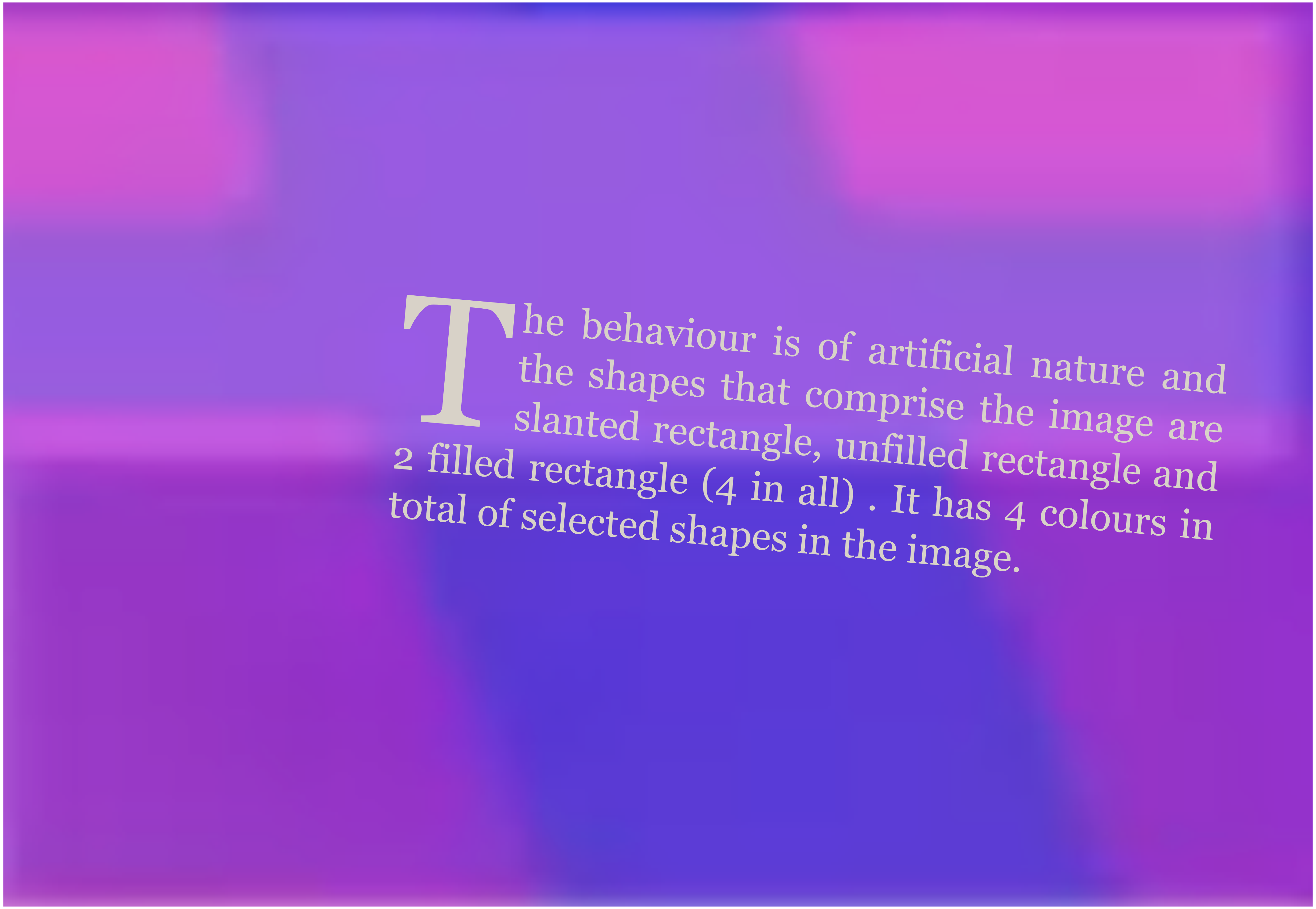
There are about 9 participant images in this experimental group with its variable, 4. The case-level of participation images is from 28 to 36. The control group has 53 un-participant images that are not selected.

CASE 1: STRIPE 4

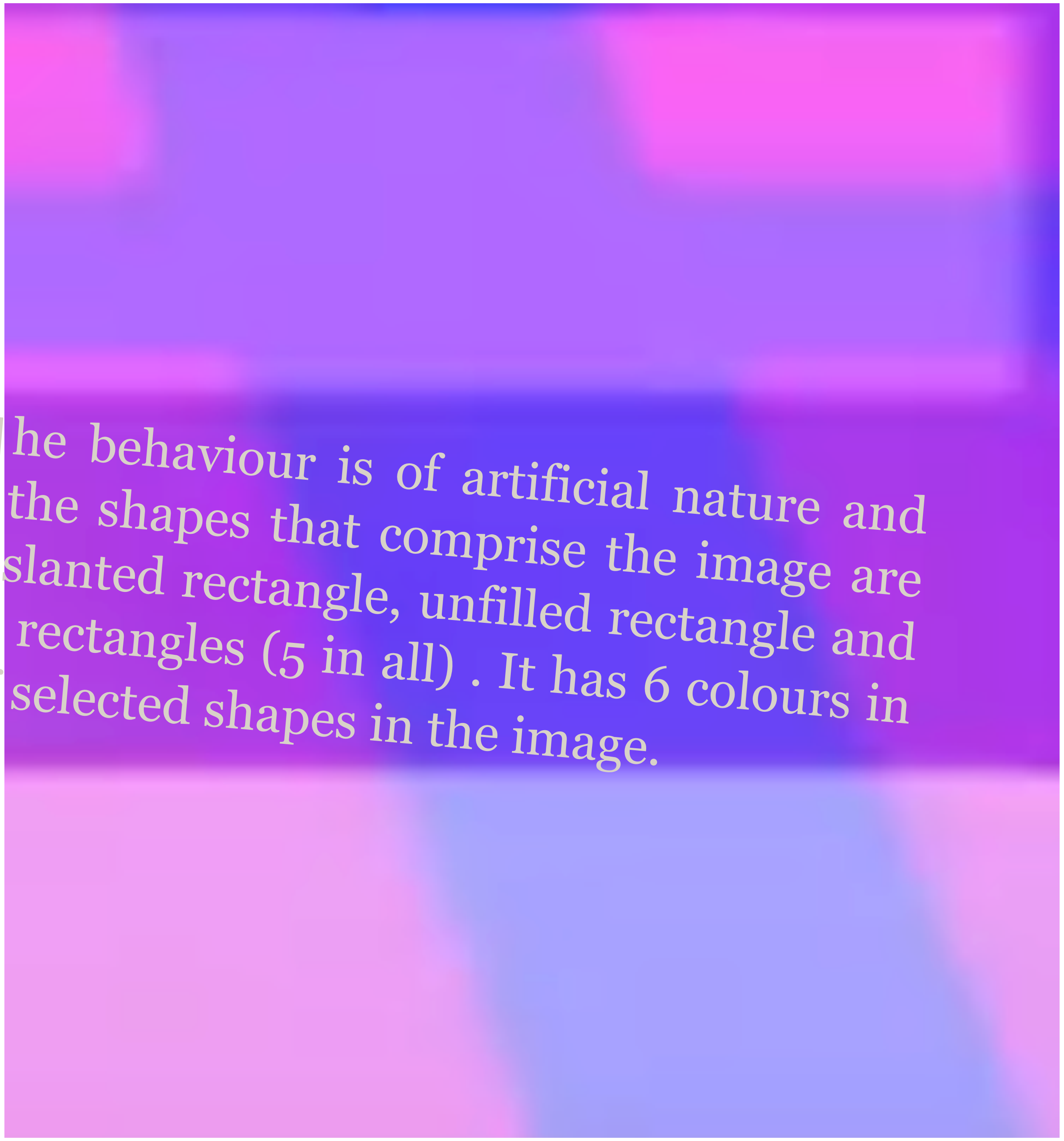
PARTICIPANT IMAGE



The behaviour is of artificial nature and the shapes that comprise the image are slanted rectangle, unfilled rectangle and 2 filled rectangle (4 in all) . It has 4 colours in total of selected shapes in the image.

CASE 2: STRIPE 4

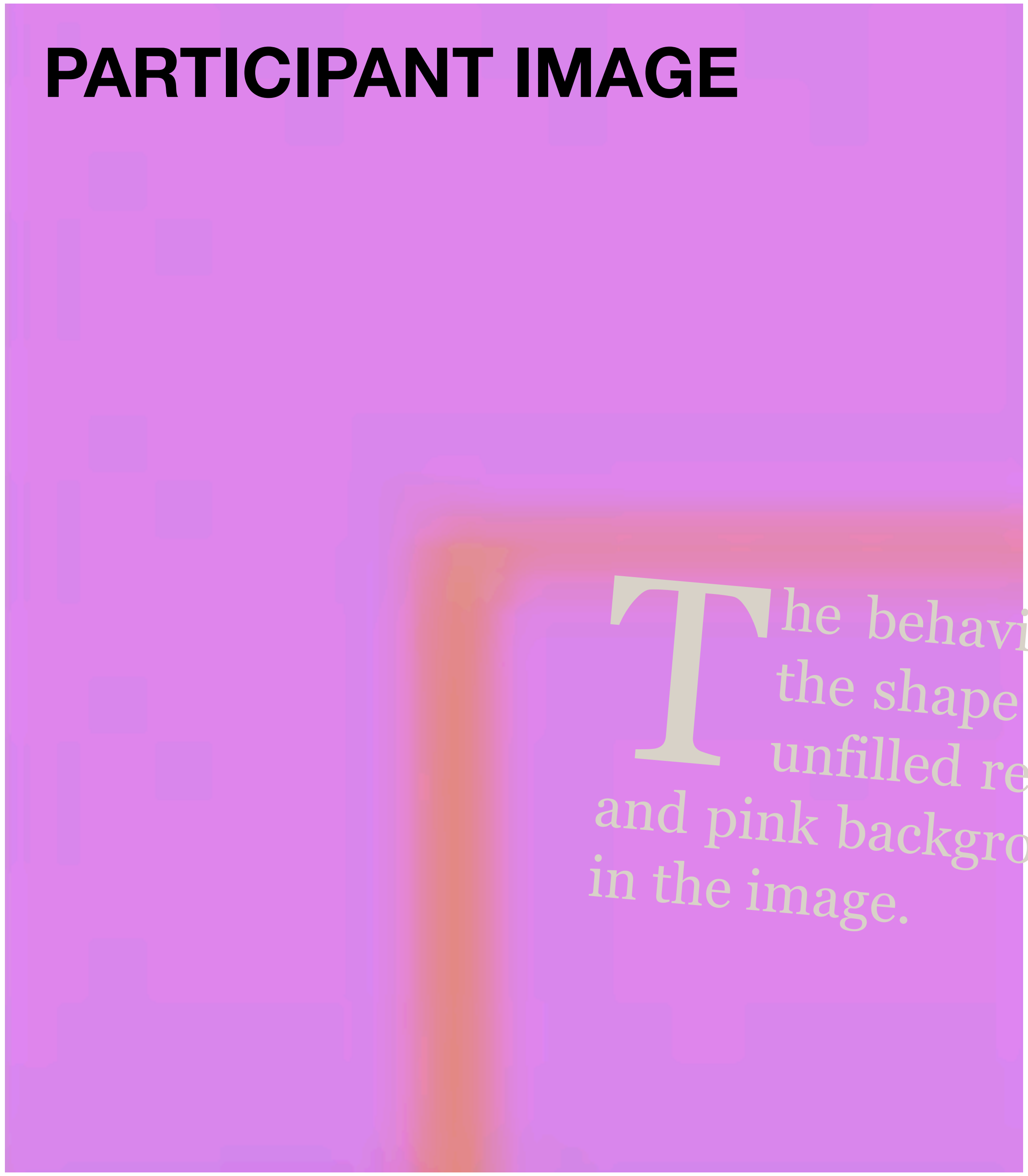
PARTICIPANT IMAGE



The behaviour is of artificial nature and the shapes that comprise the image are slanted rectangle, unfilled rectangle and 3 filled rectangles (5 in all) . It has 6 colours in total of selected shapes in the image.

CASE 3: STRIPE 4

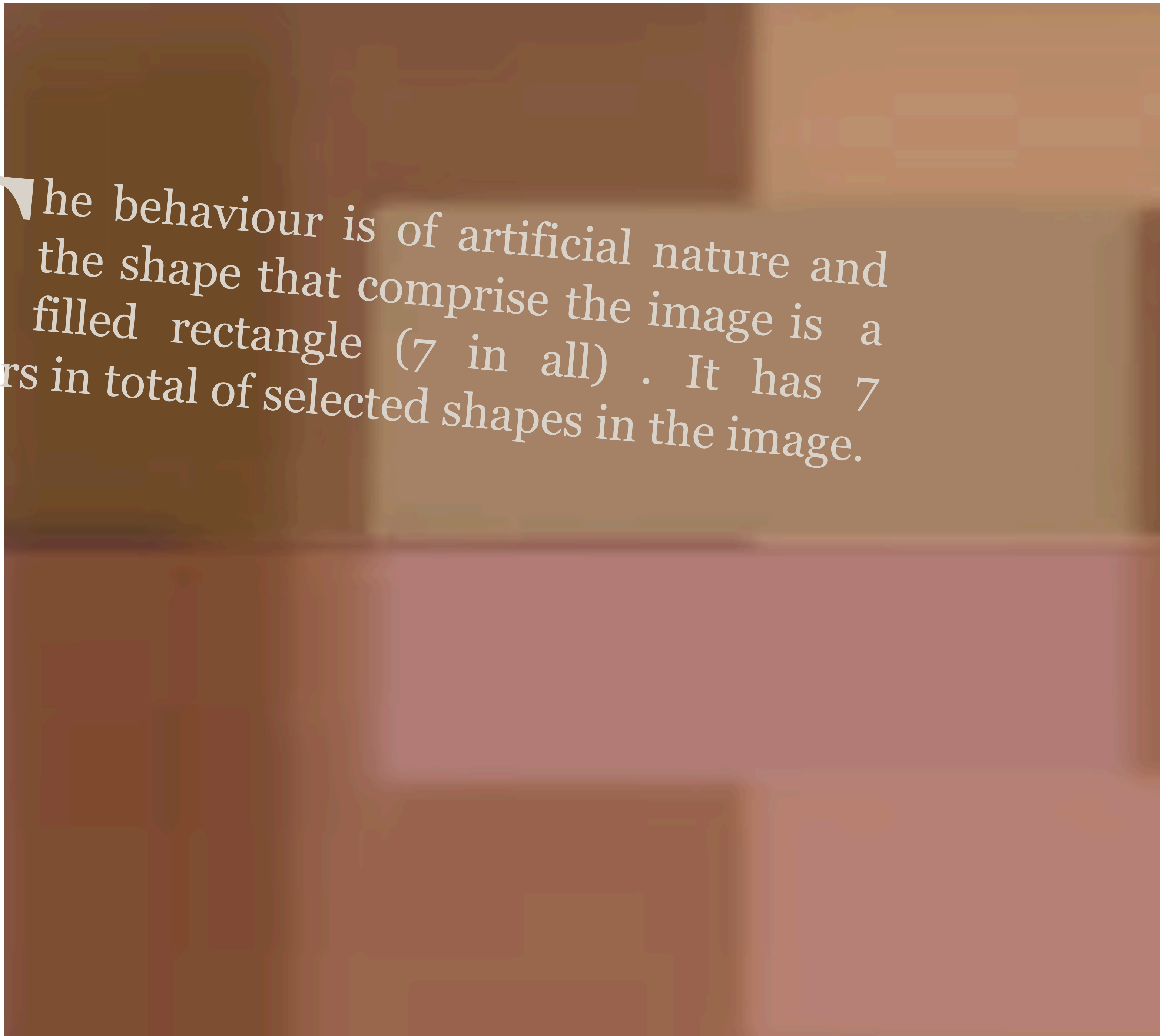
PARTICIPANT IMAGE



The behaviour is of artificial nature and the shape that comprise the image is an unfilled rectangle. It has 1 brown colour and pink background in total of selected shape in the image.

CASE 4: STRIPE 4

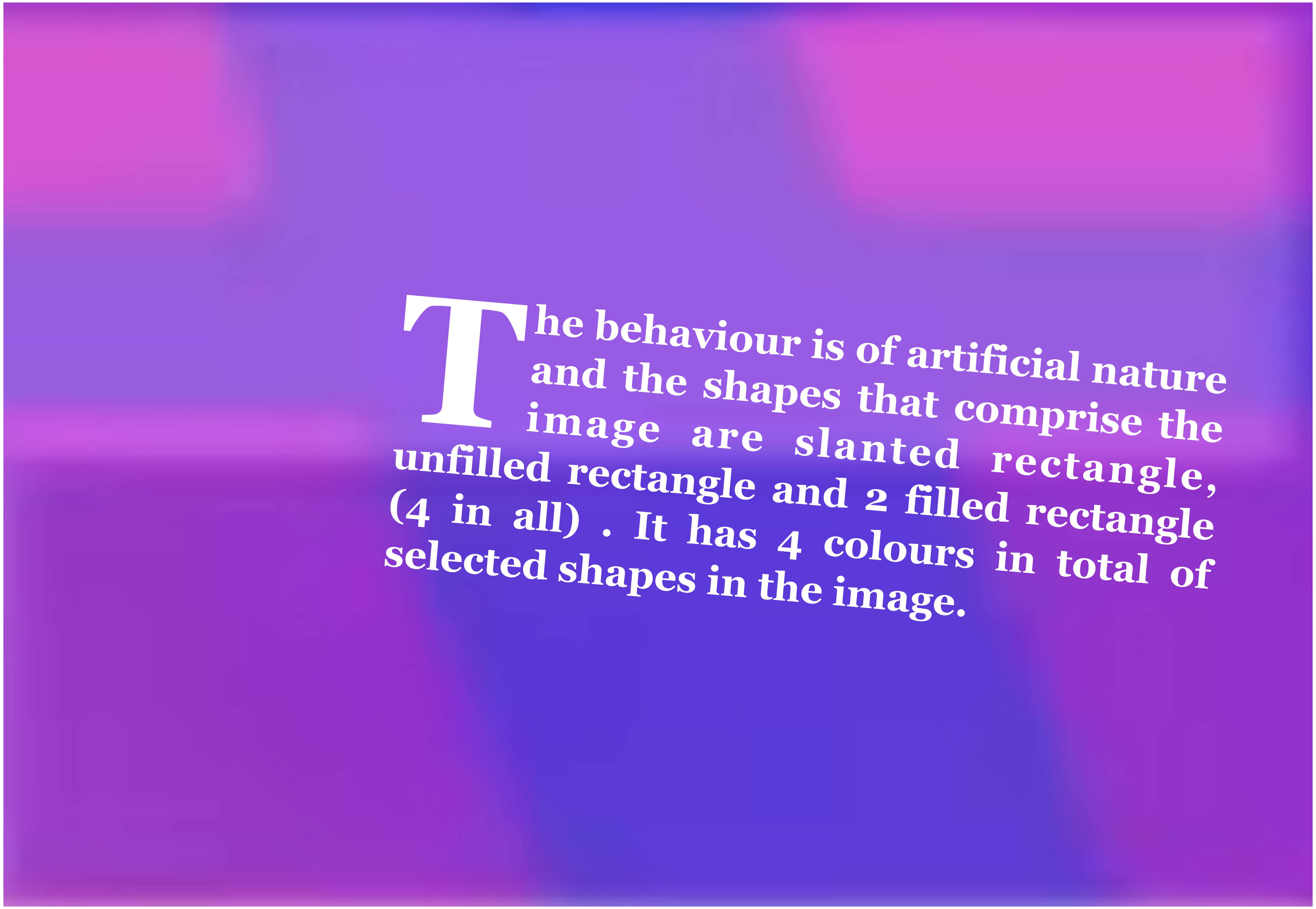
PARTICIPANT IMAGE



The behaviour is of artificial nature and the shape that comprise the image is a filled rectangle (7 in all) . It has 7 colours in total of selected shapes in the image.

CASE 5: STRIPE 4

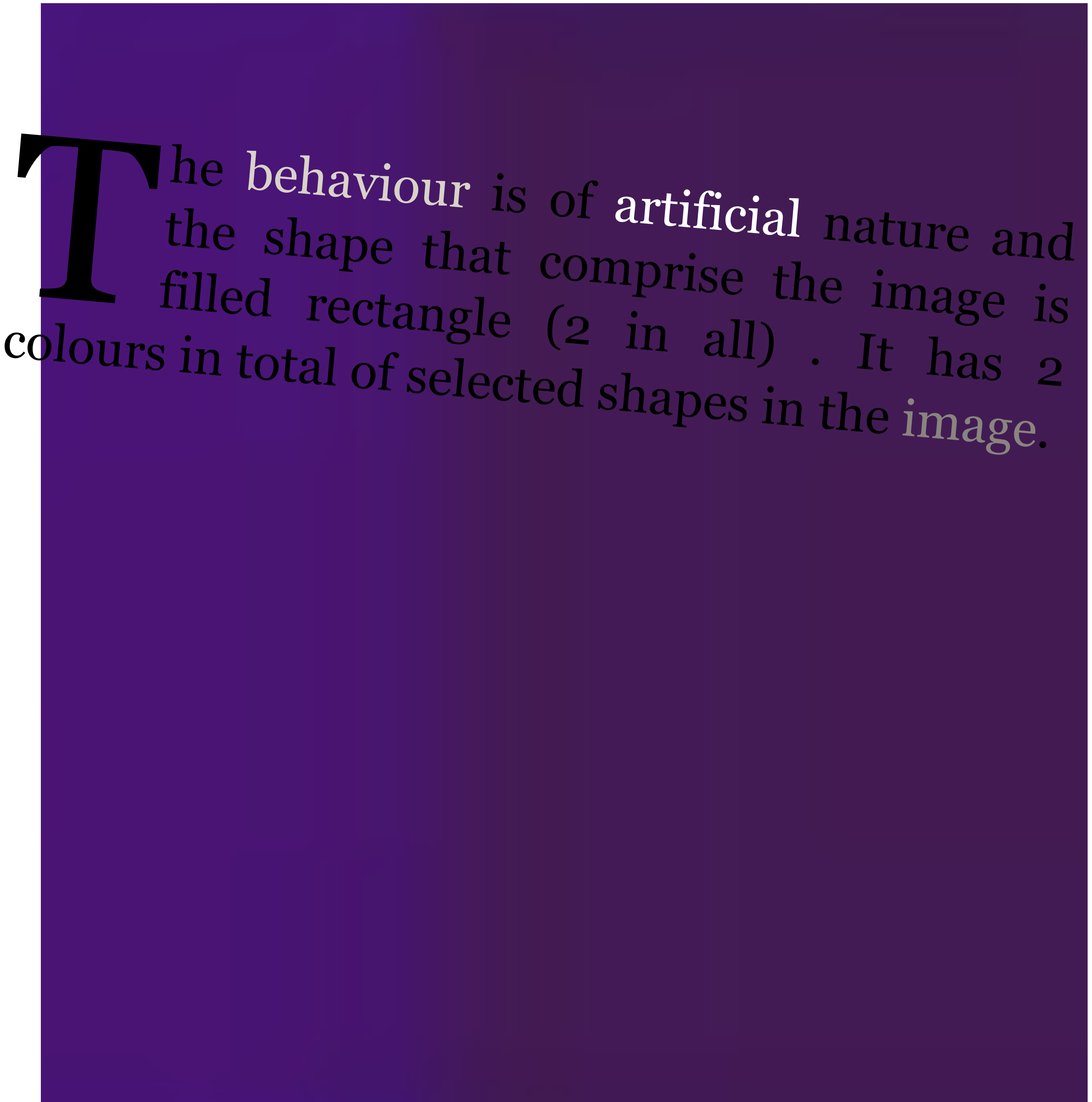
PARTICIPANT IMAGE



The behaviour is of artificial nature and the shapes that comprise the image are slanted rectangle, unfilled rectangle and 2 filled rectangle (4 in all) . It has 4 colours in total of selected shapes in the image.

CASE 6: STRIPE 4

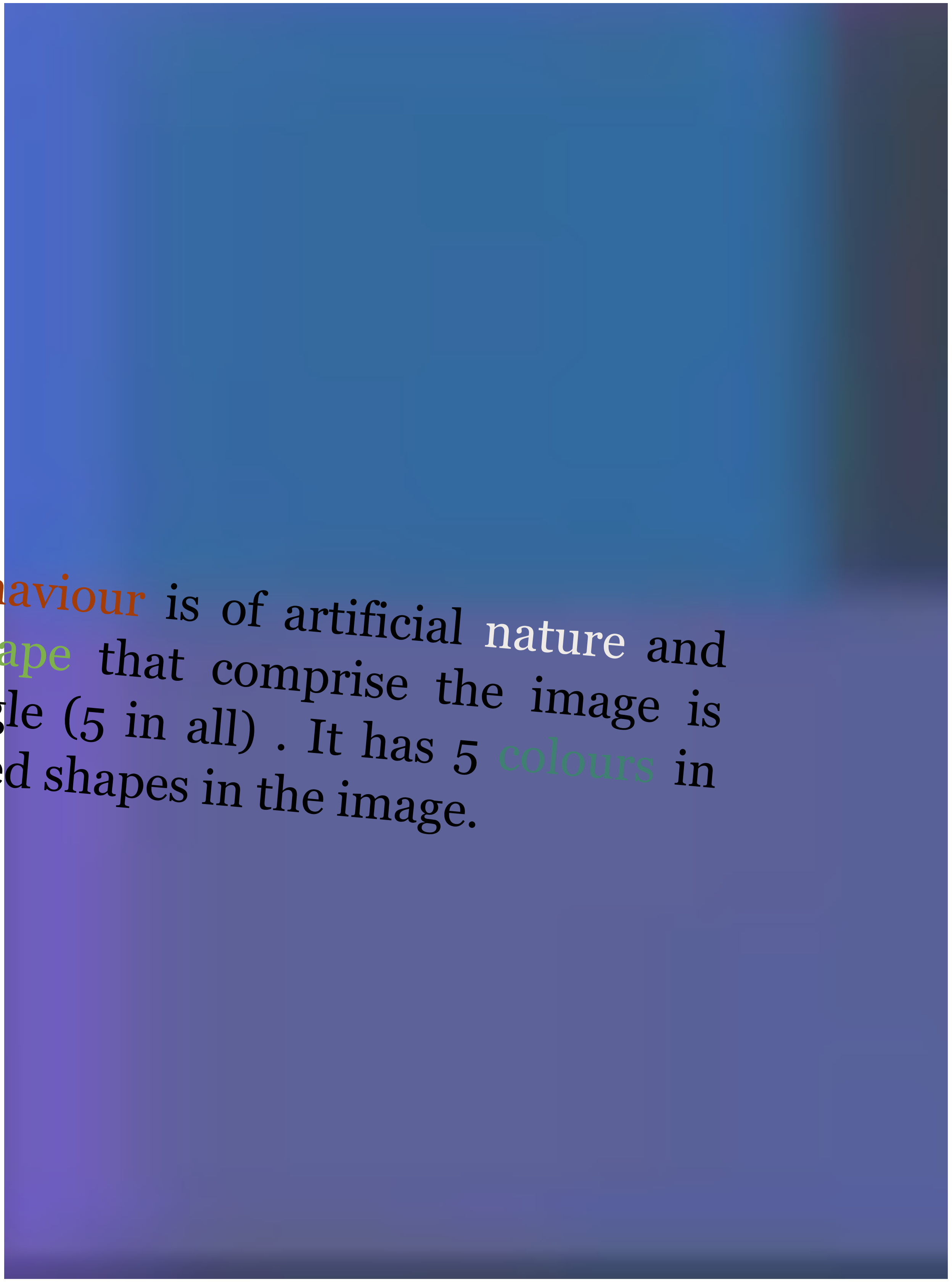
PARTICIPANT IMAGE



The behaviour is of artificial nature and the shape that comprise the image is filled rectangle (2 in all) . It has 2 colours in total of selected shapes in the image.

CASE 7 : STRIPE 4

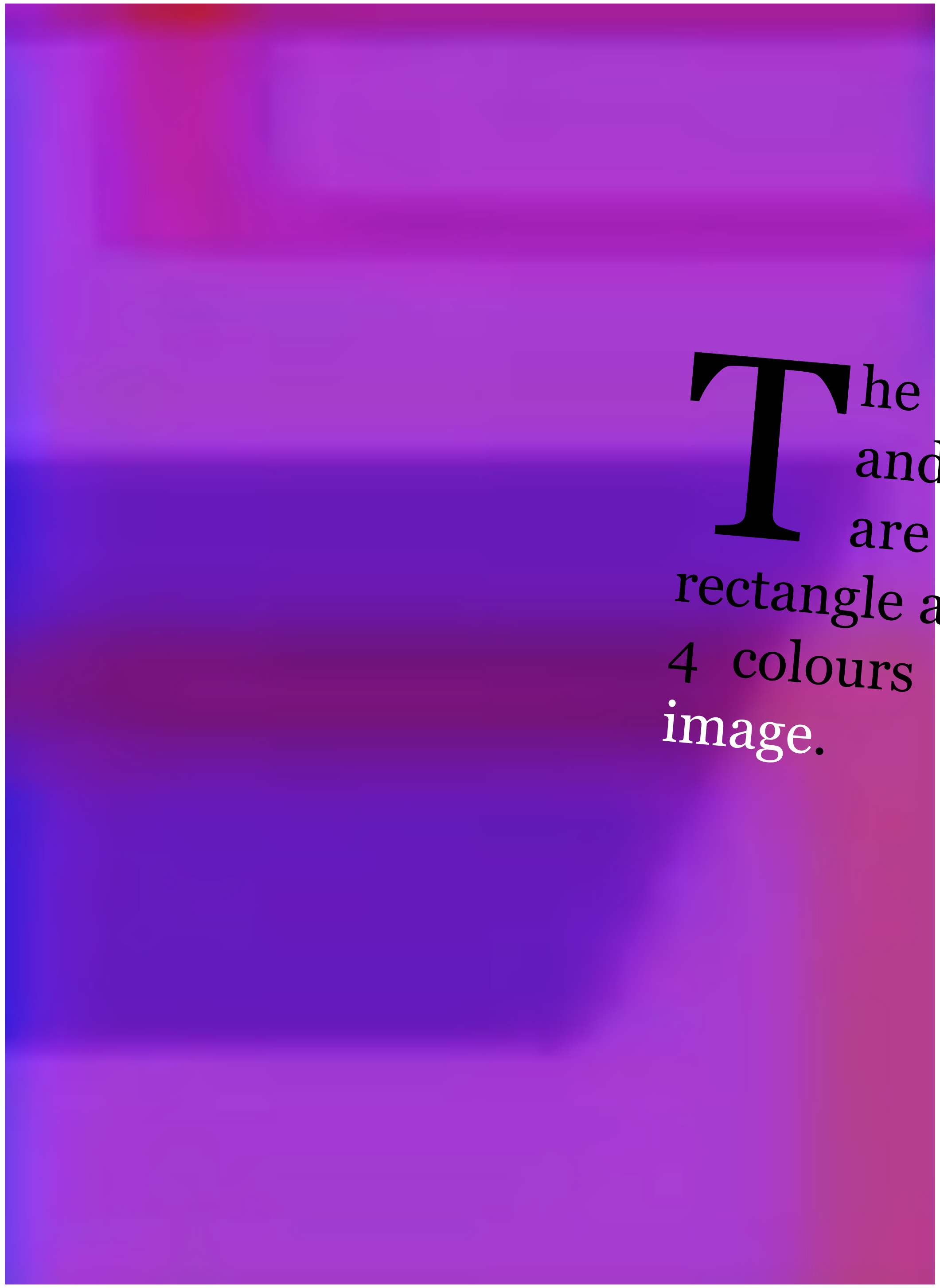
PARTICIPANT IMAGE



The behaviour is of artificial nature and the shape that comprise the image is rectangle (5 in all) . It has 5 colours in total of selected shapes in the image.

CASE 8: STRIPE 4

PARTICIPANT IMAGE

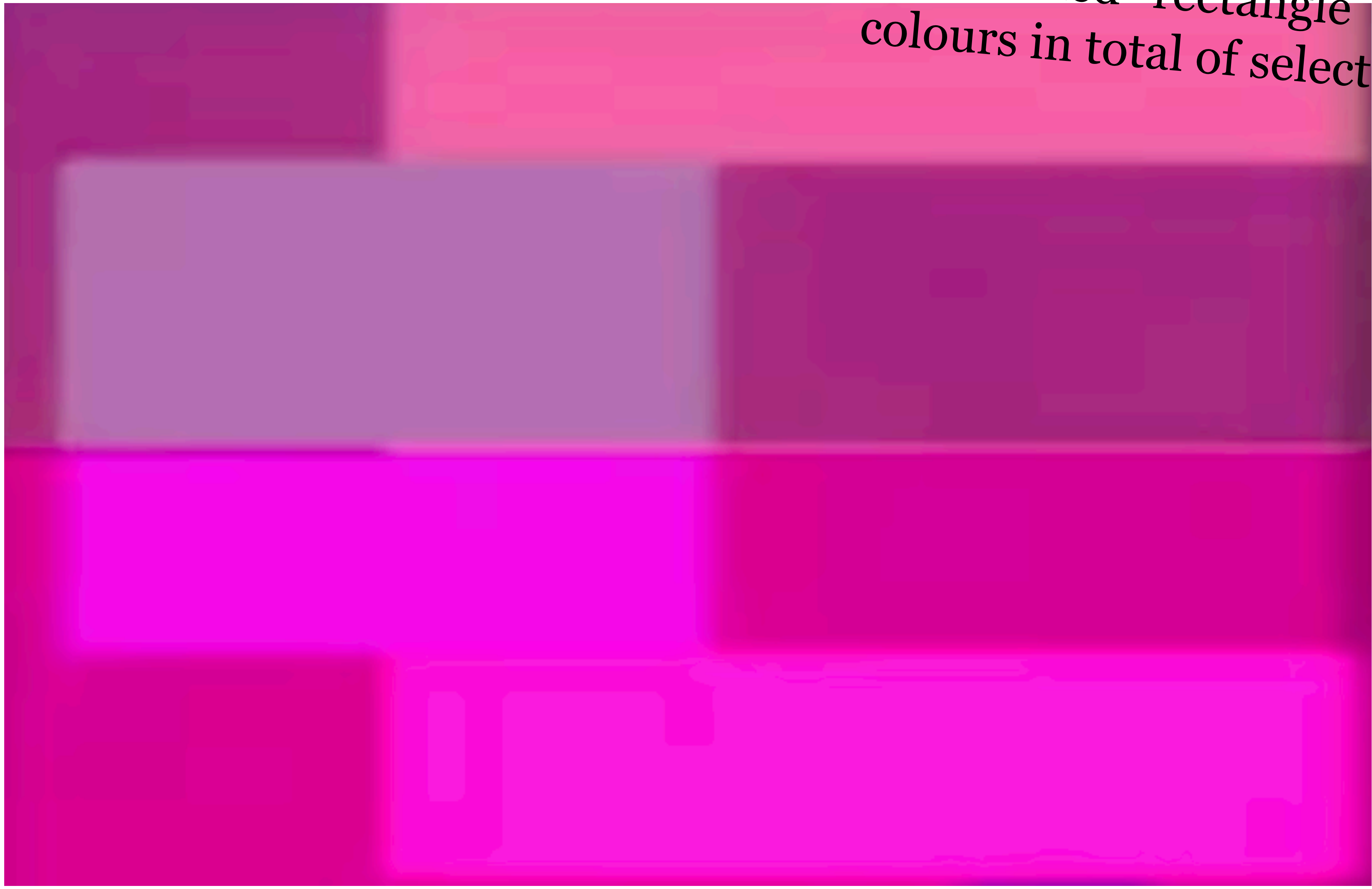


The behaviour is of **artificial nature** and the shapes that comprise the image are truncated trapezium, 2 unfilled rectangle and 1 filled rectangle (4 in all) . It has 4 colours in total of selected shapes in the image.

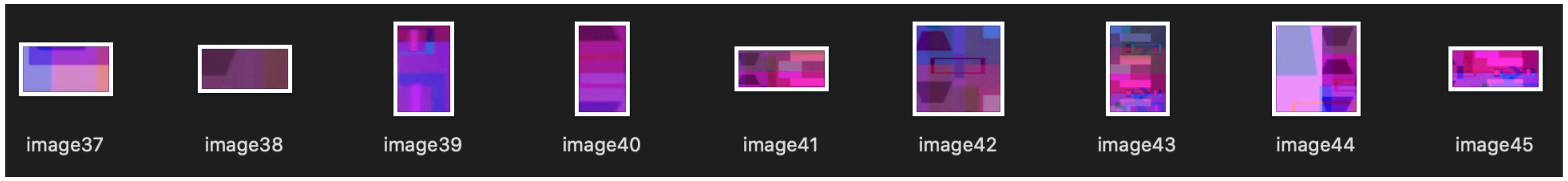
CASE 9: STRIPE 4

PARTICIPANT IMAGE

The behaviour is of artificial nature and the shape that comprise the image is a filled rectangle (6 in all) . It has 6 colours in total of selected shapes in the image.



Stripe 5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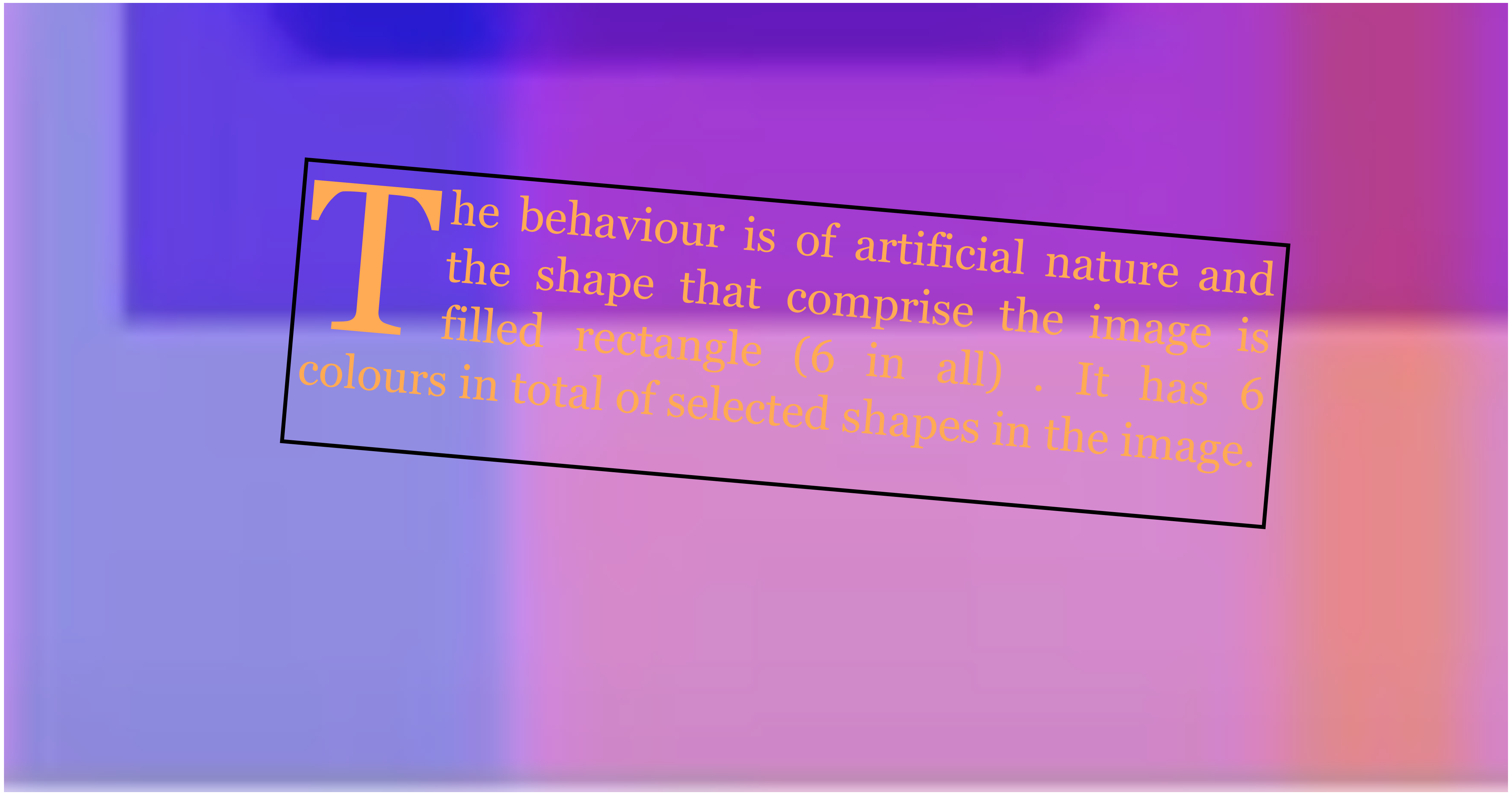
There are about 9 participant images in this experimental group with its variable, 5. The case-level of participation images is from 37 to 45. The control group has 53 un-participant images that are not selected.

CASE 1: STRIPE 5

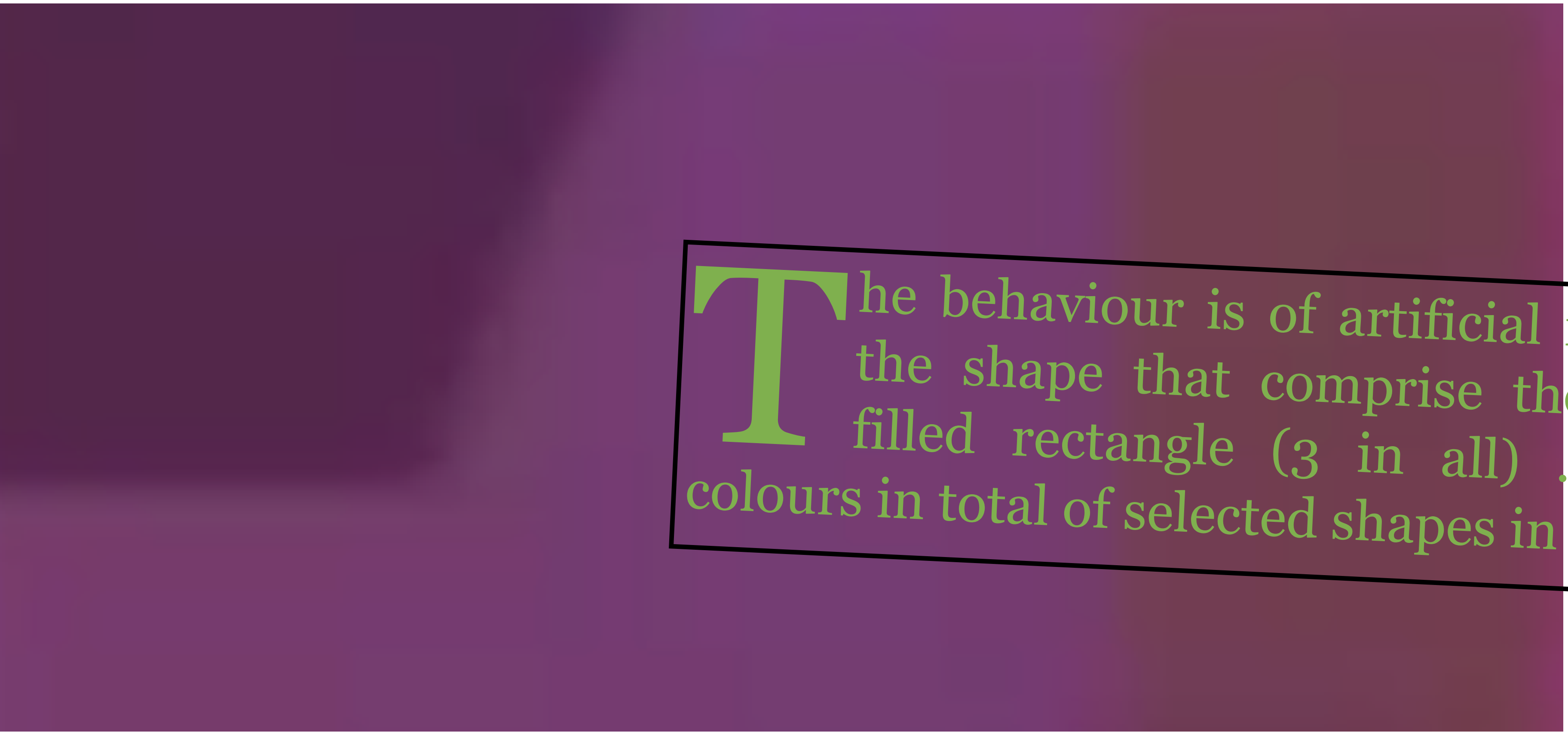
PARTICIPANT IMAGE



The behaviour is of artificial nature and the shape that comprise the image is filled rectangle (6 in all) . It has 6 colours in total of selected shapes in the image.

CASE 2: STRIPE 5

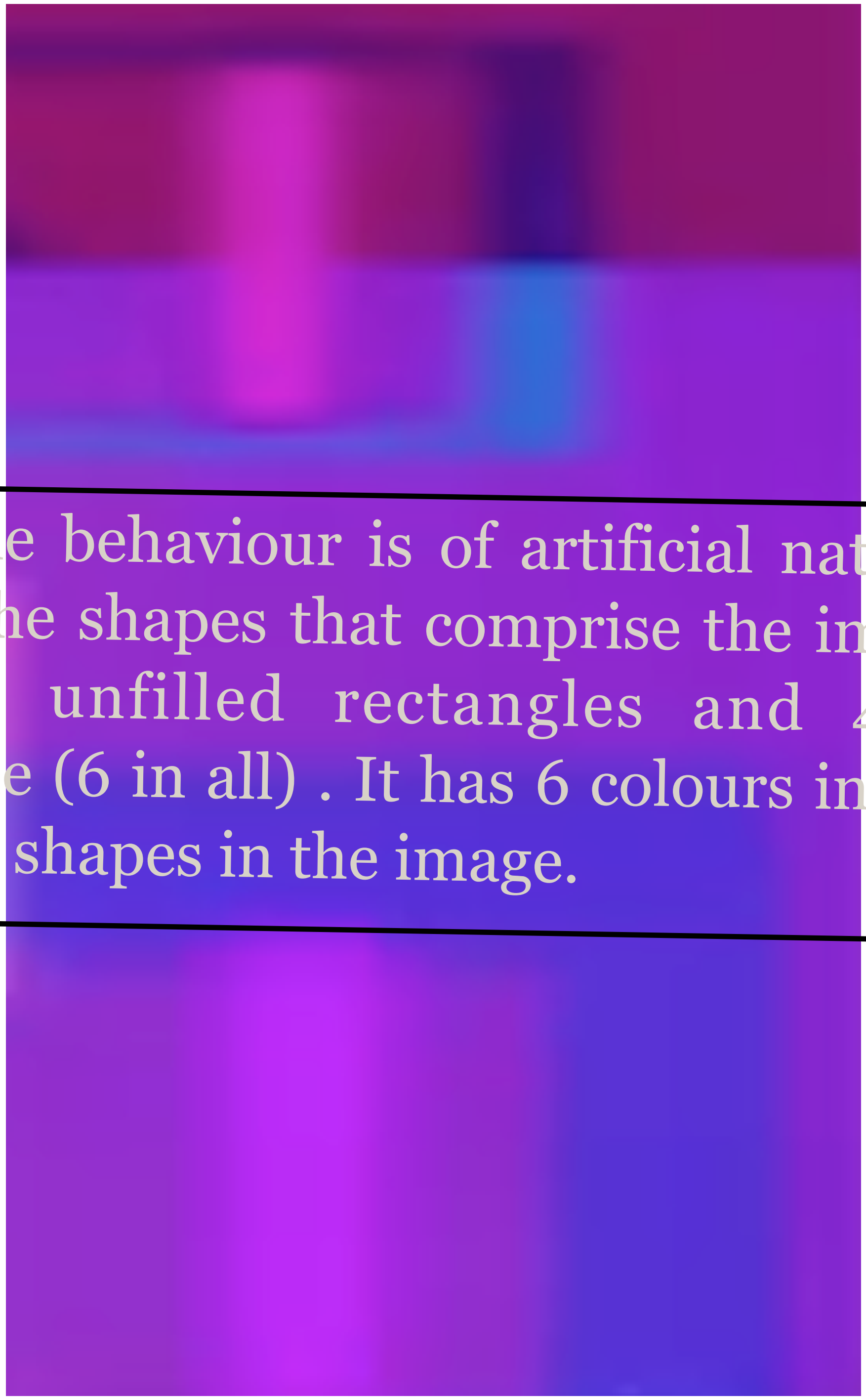
PARTICIPANT IMAGE



The behaviour is of artificial nature and the shape that comprise the image is filled rectangle (3 in all) . It has 4 colours in total of selected shapes in the image.

CASE 3: STRIPE 5

PARTICIPANT IMAGE

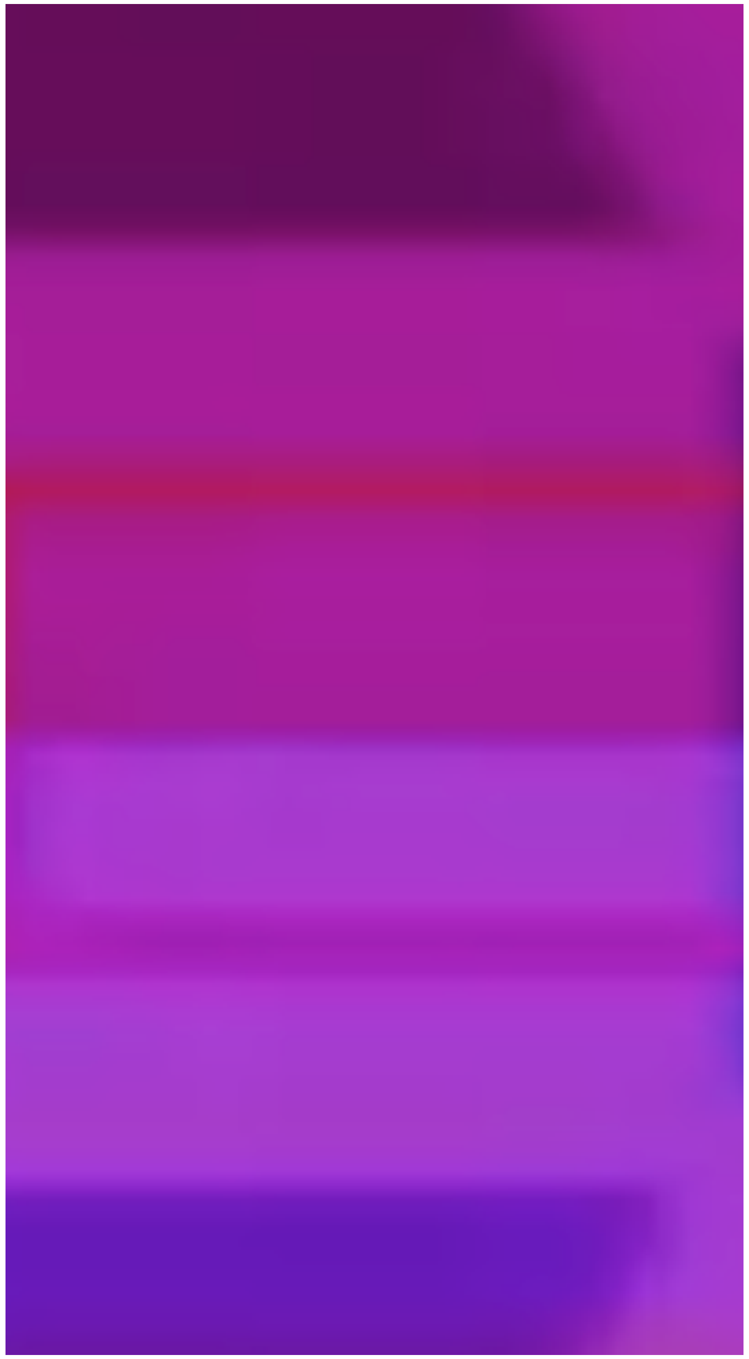


The behaviour is of artificial nature and the shapes that comprise the image are 2 unfilled rectangles and 4 filled rectangle (6 in all) . It has 6 colours in total of selected shapes in the image.

CASE 4: STRIPE 5

PARTICIPANT IMAGE

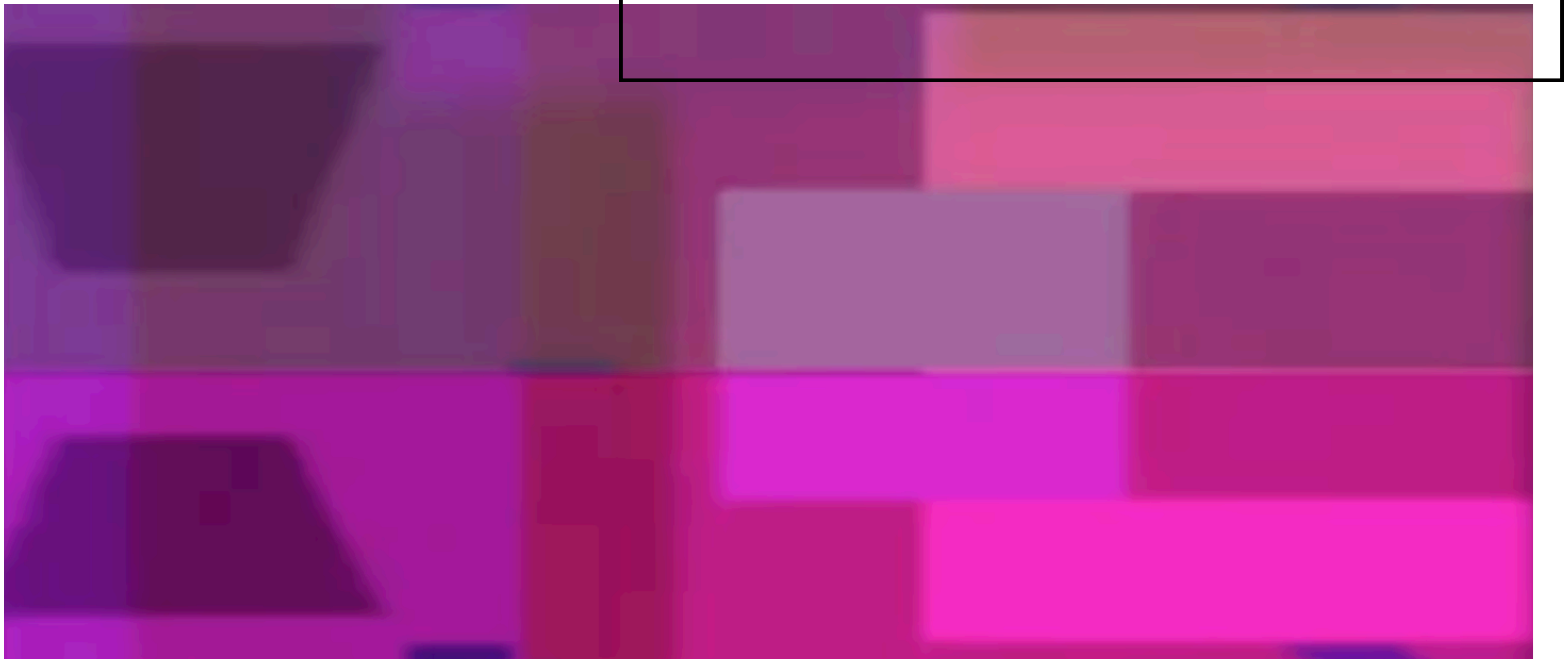
The behaviour is of artificial nature and the shapes that comprise the image are two inverted trapeziums, 1 unfilled rectangle and 3 filled rectangles(6 in all) . It has 5 colours in total of selected shapes in the image.



CASE 5: STRIPE 5

PARTICIPANT IMAGE

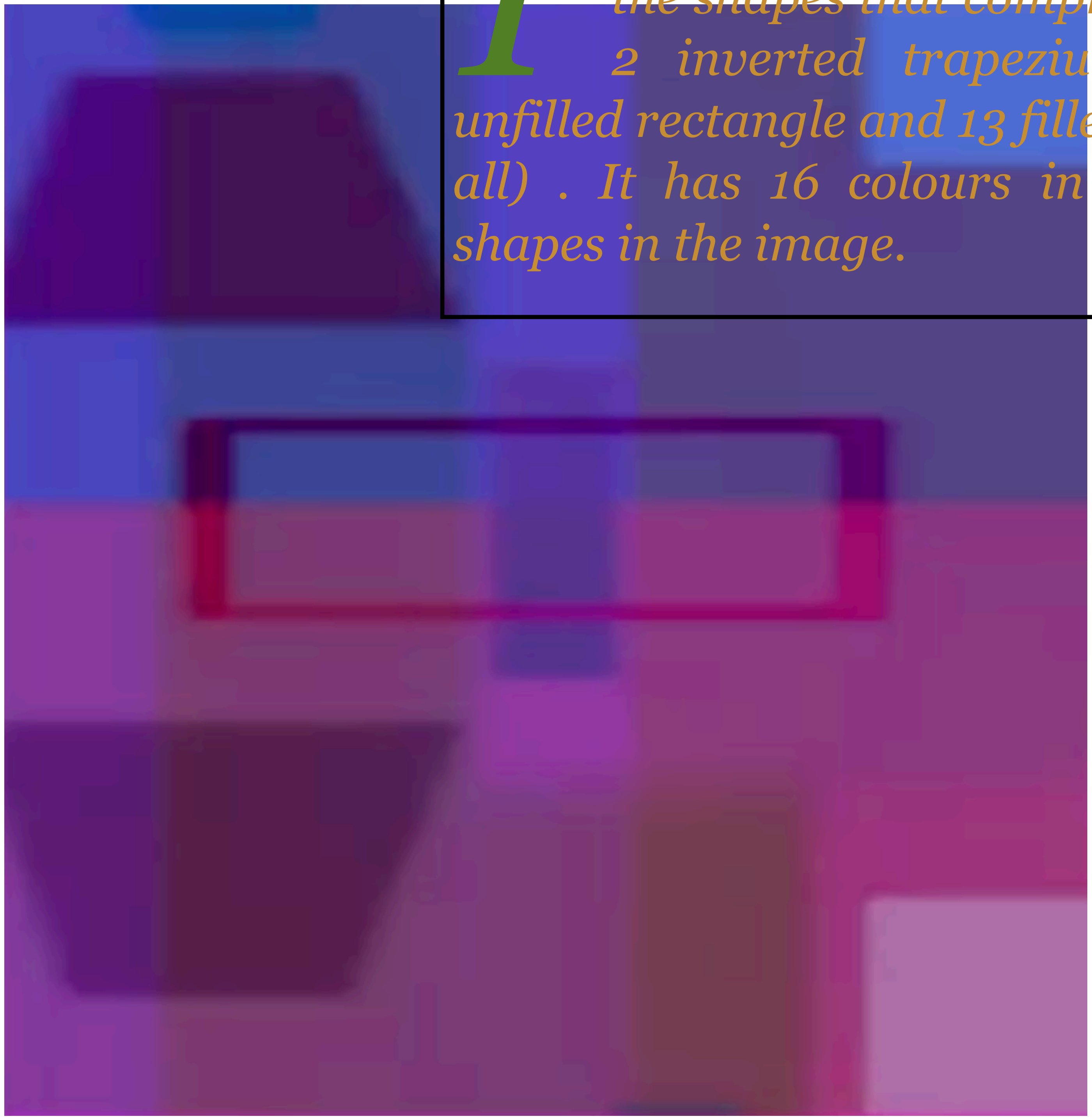
The behaviour is of artificial nature and the shapes that comprise the image are 2 inverted trapeziums and 11 filled rectangles(13 in all) . It has 13 colours in total of selected shapes in the image.



CASE 6: STRIPE 5

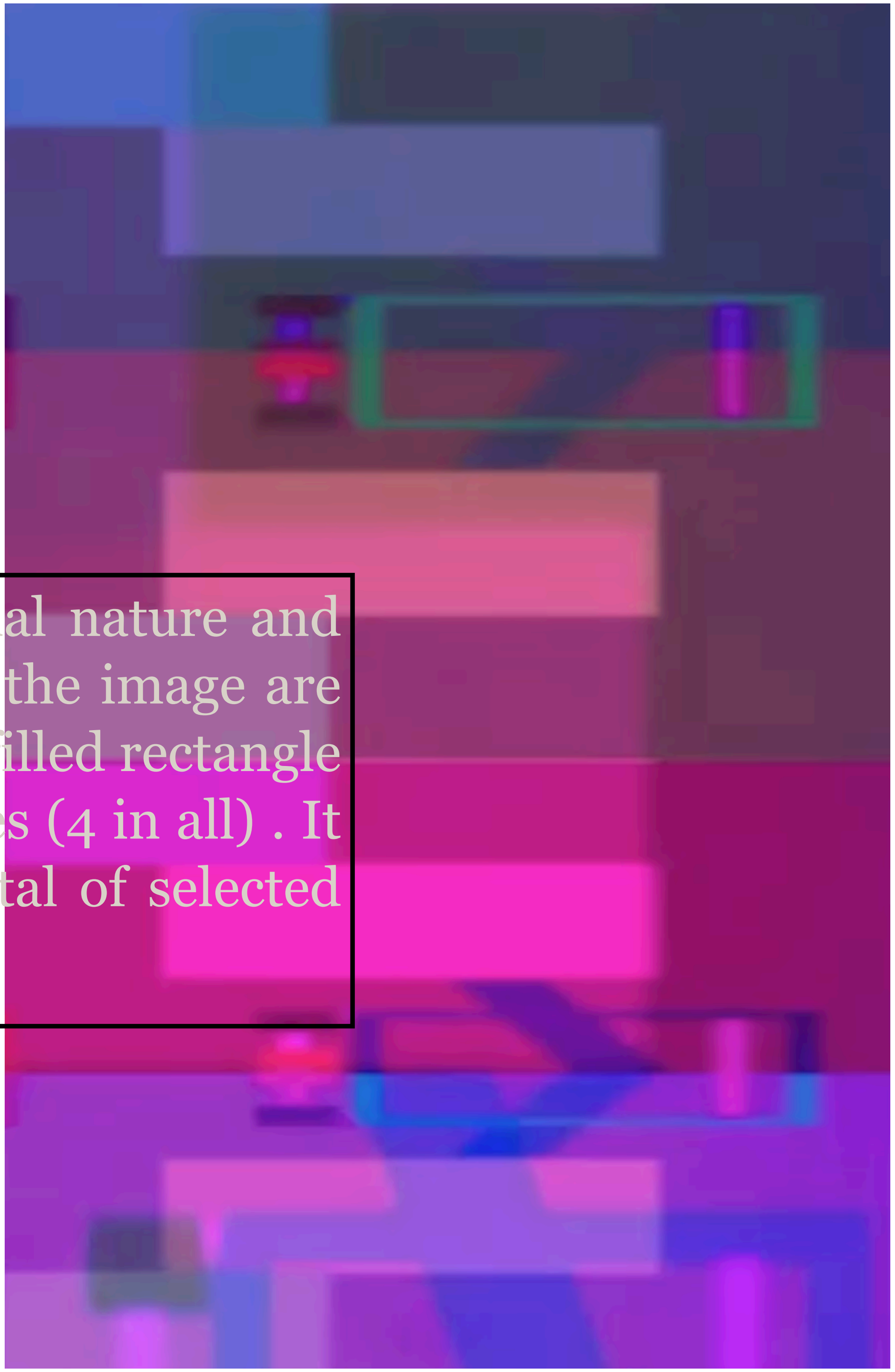
PARTICIPANT IMAGE

The behaviour is of artificial nature and the shapes that comprise the image are 2 inverted trapeziums, rectangle, 1 unfilled rectangle and 13 filled rectangle (16 in all) . It has 16 colours in total of selected shapes in the image.



CASE 7 : STRIPE 5

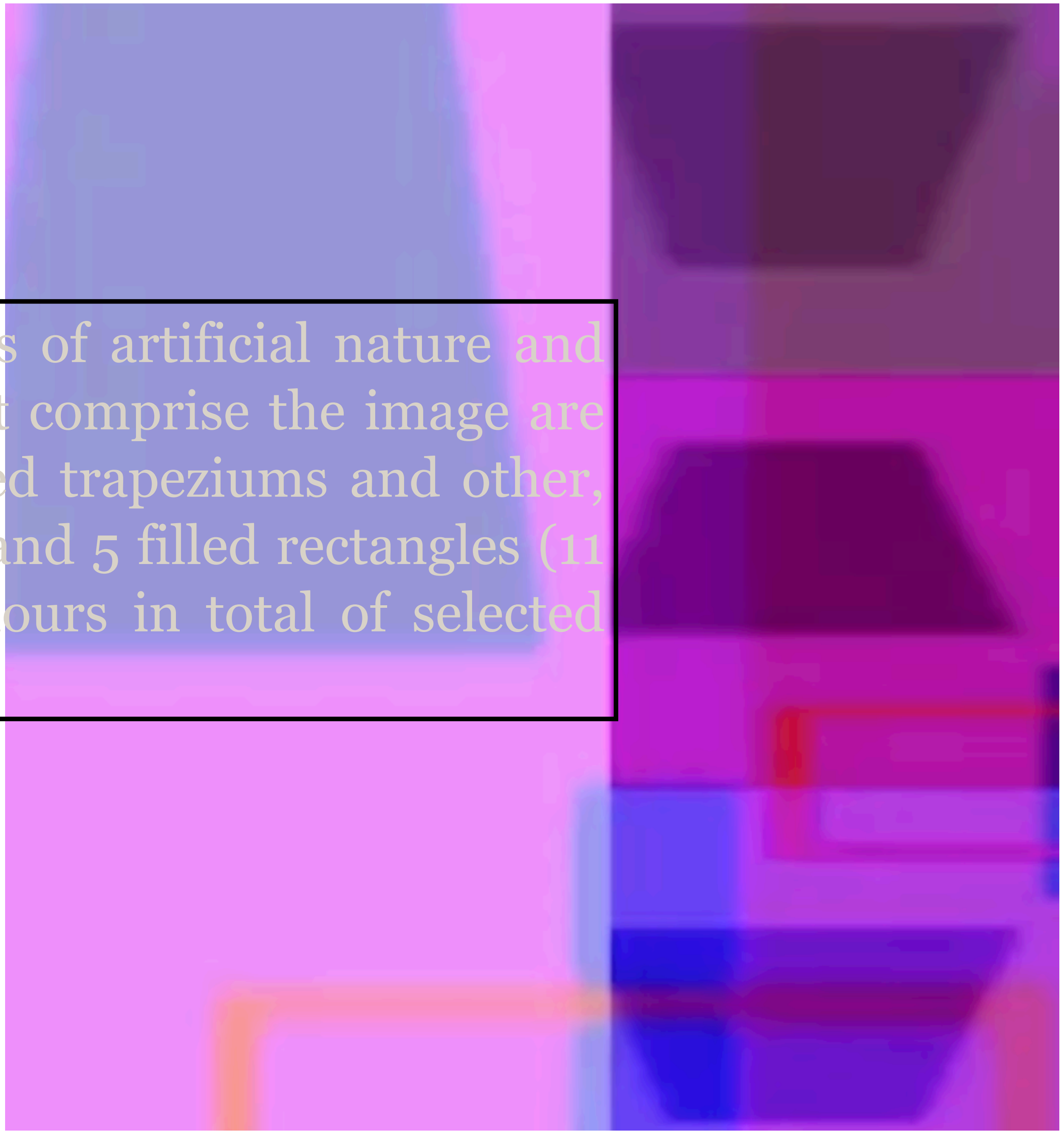
PARTICIPANT IMAGE



The behaviour is of artificial nature and the shapes that comprise the image are 2 slanted rectangles, 3 unfilled rectangle sand more than 7 filled rectangles (4 in all) . It has MORE than 4 colours in total of selected shapes in the image.

CASE 8: STRIPE 5

PARTICIPANT IMAGE

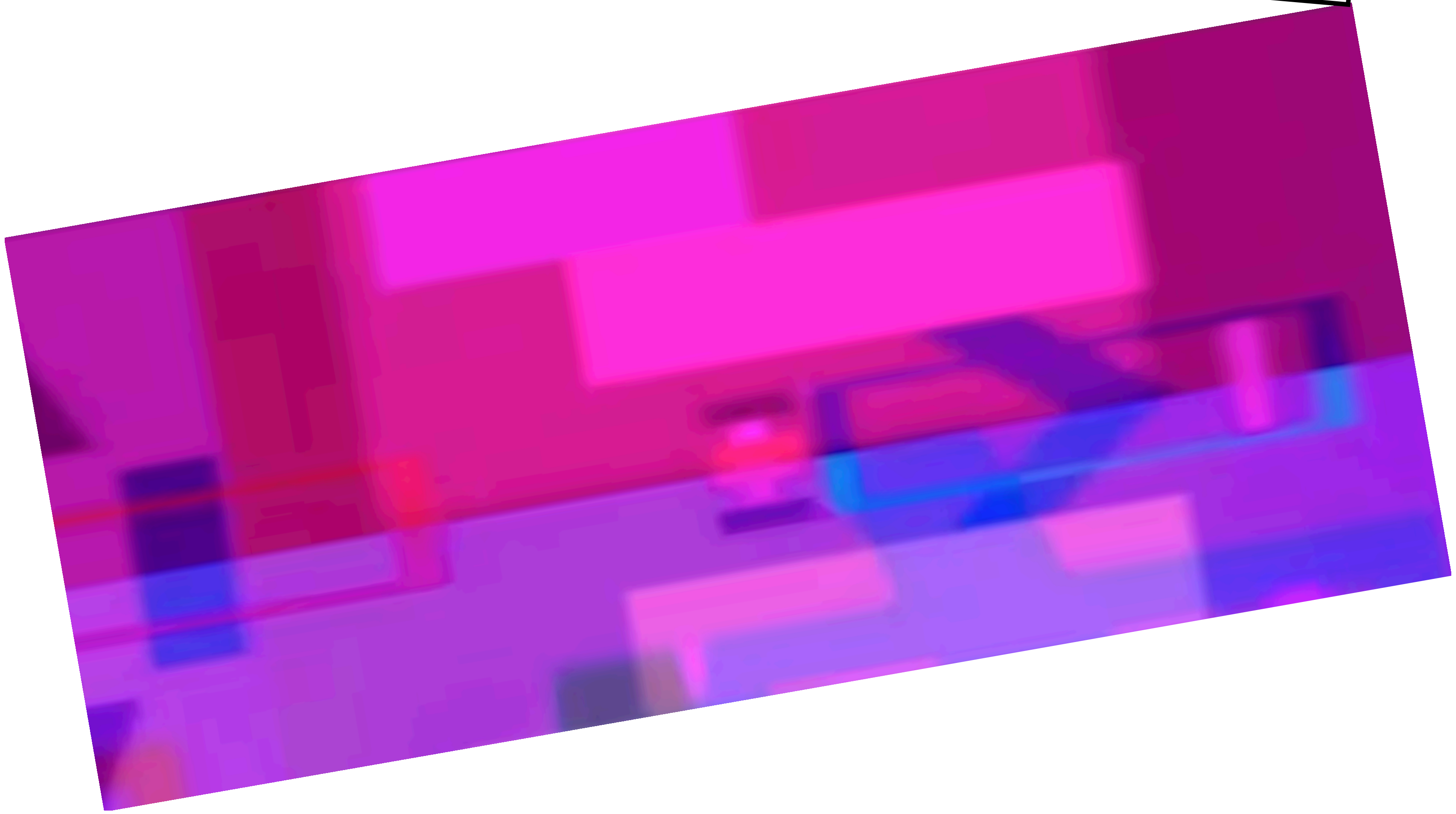


The behaviour is of artificial nature and the shapes that comprise the image are 3 invert-chained trapeziums and other, 2 unfilled rectangles and 5 filled rectangles (11 in all) . It has 11 colours in total of selected shapes in the image.

CASE 9: STRIPE 5

PARTICIPANT IMAGE

The behaviour is of artificial nature and the shapes that comprise the image are 3 trapezoids, slanted rectangle, 3 unfilled rectangles, greater-than symbol and 10 filled rectangles (18 in all) . It has 12 colours in total of selected shapes in the image.



Stripe 6

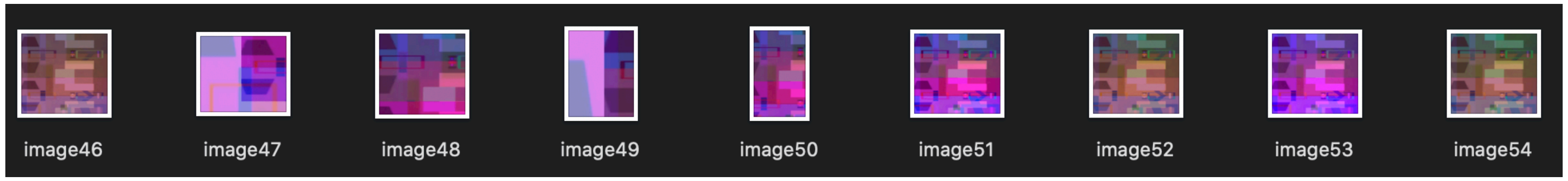


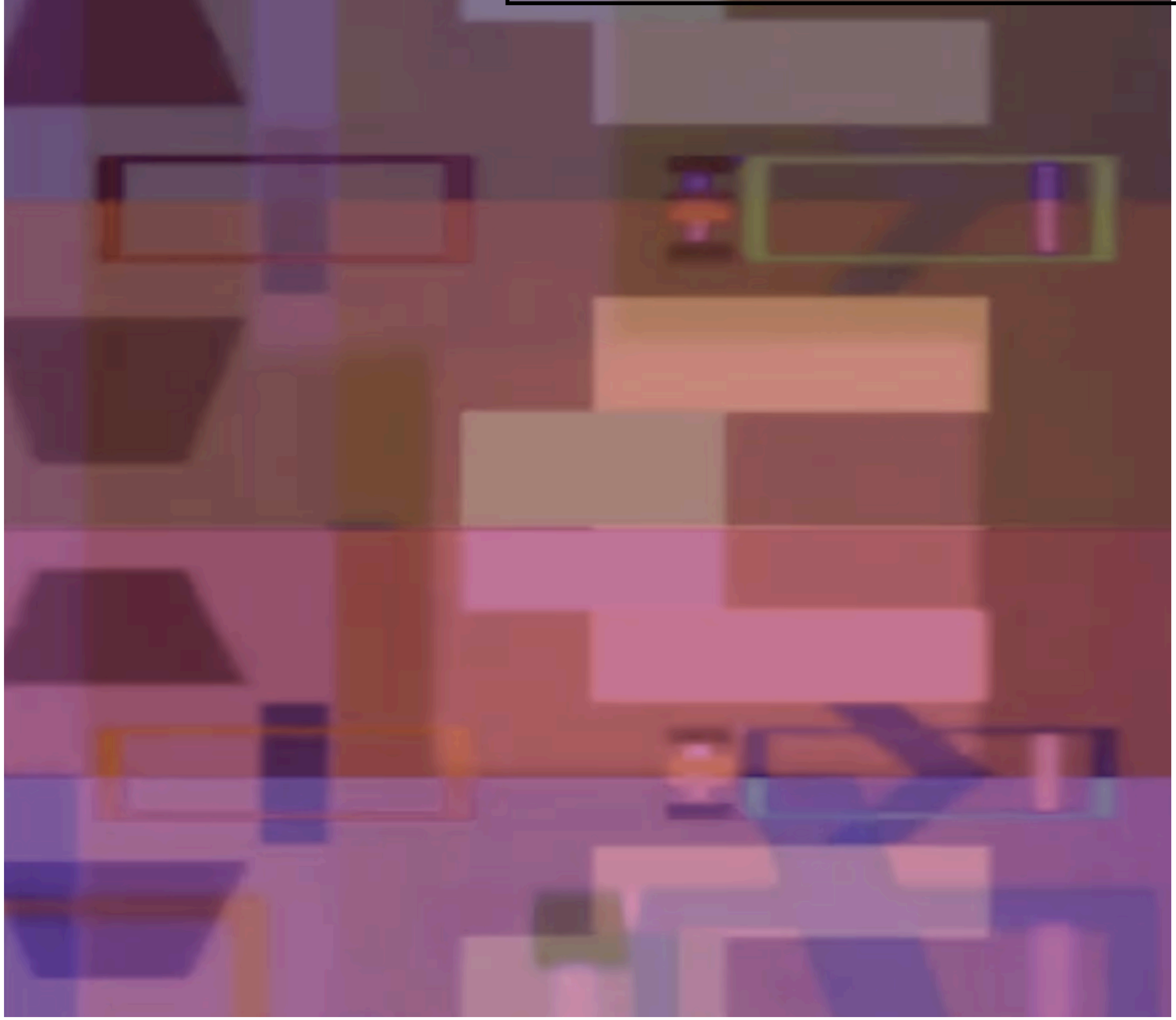
image46
image47
image48
image49
image50
image51
image52
image53
image54

There are about 9 participant images in this experimental group with its variable, 6. The case-level of participation images is from 46 to 54. The control group has 53 un-participant images that are not selected.

CASE 1: STRIPE 6

PARTICIPANT IMAGE

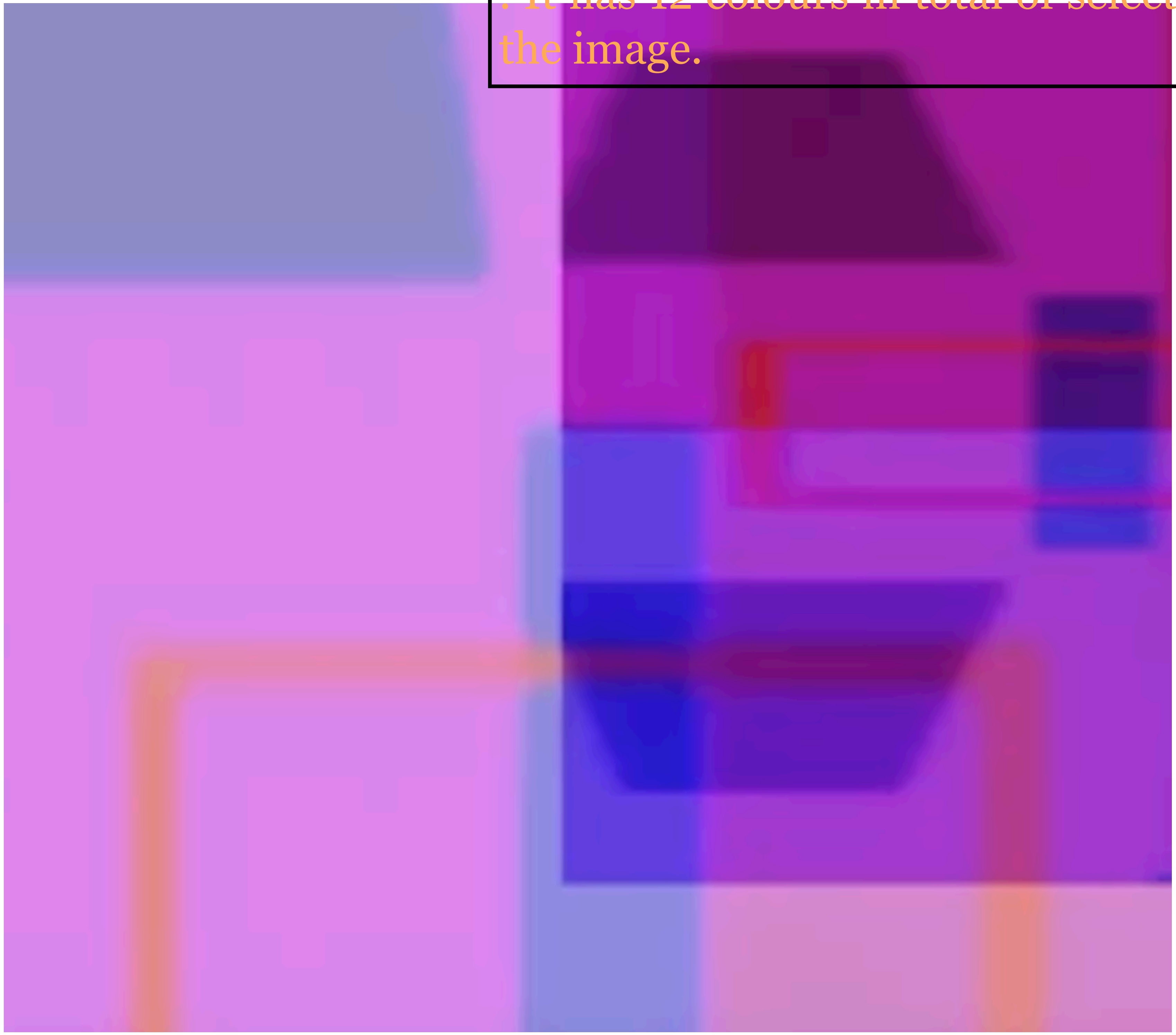
The behaviour is of artificial nature and the shapes that comprise the image are four trapeziums, 2 slanted rectangles, 1 greater-than symbol, 5 unfilled rectangles and more filled rectangles. It has more than 12 colours in total of selected shapes in the image.



CASE 2: STRIPE 6

PARTICIPANT IMAGE

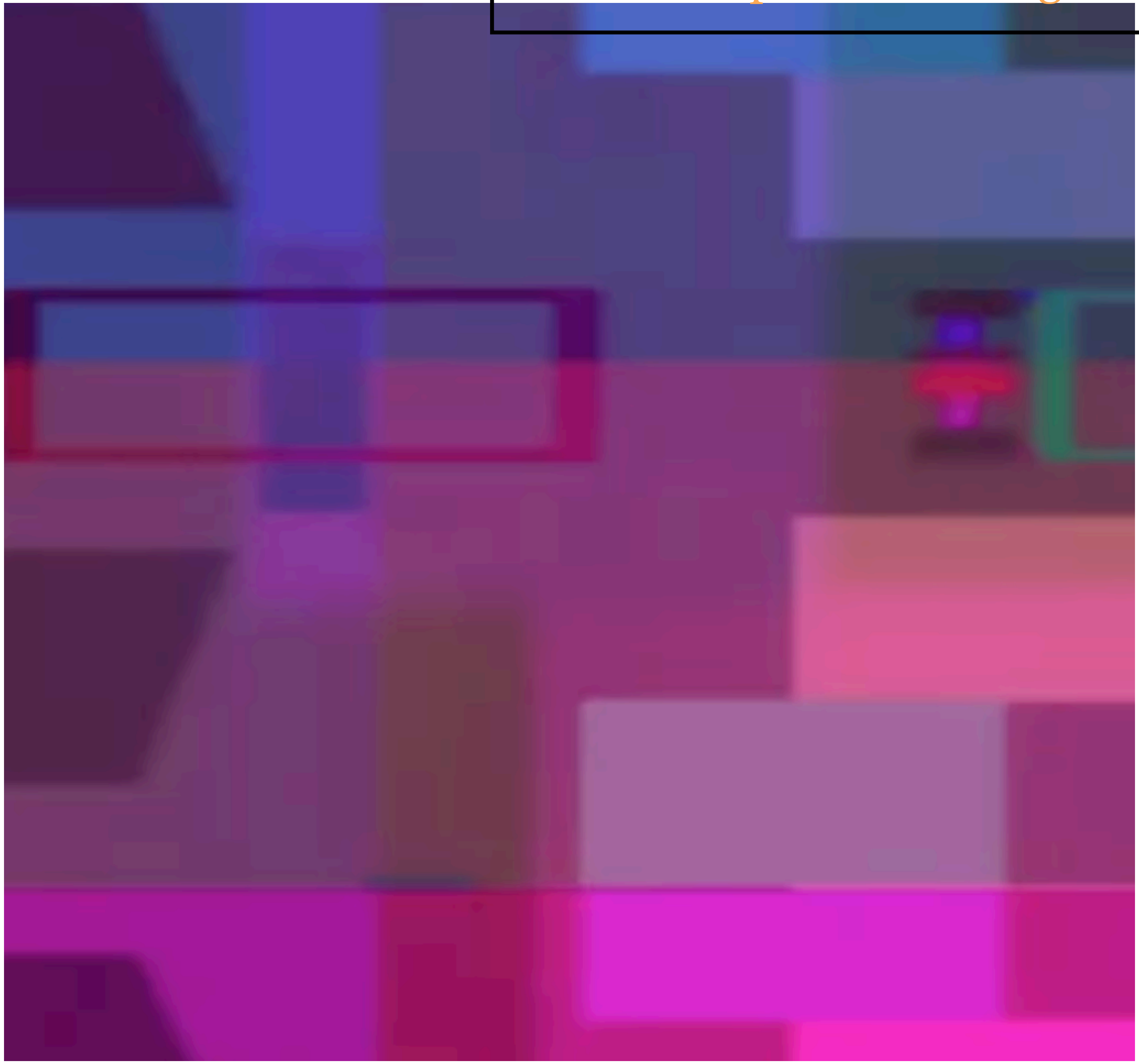
The behaviour is of artificial nature and the shapes that comprise the image are three inverted trapeziums, two unfilled rectangles and seven filled rectangles (12 in all) . It has 12 colours in total of selected shapes in the image.



CASE 3: STRIPE 6

PARTICIPANT IMAGE

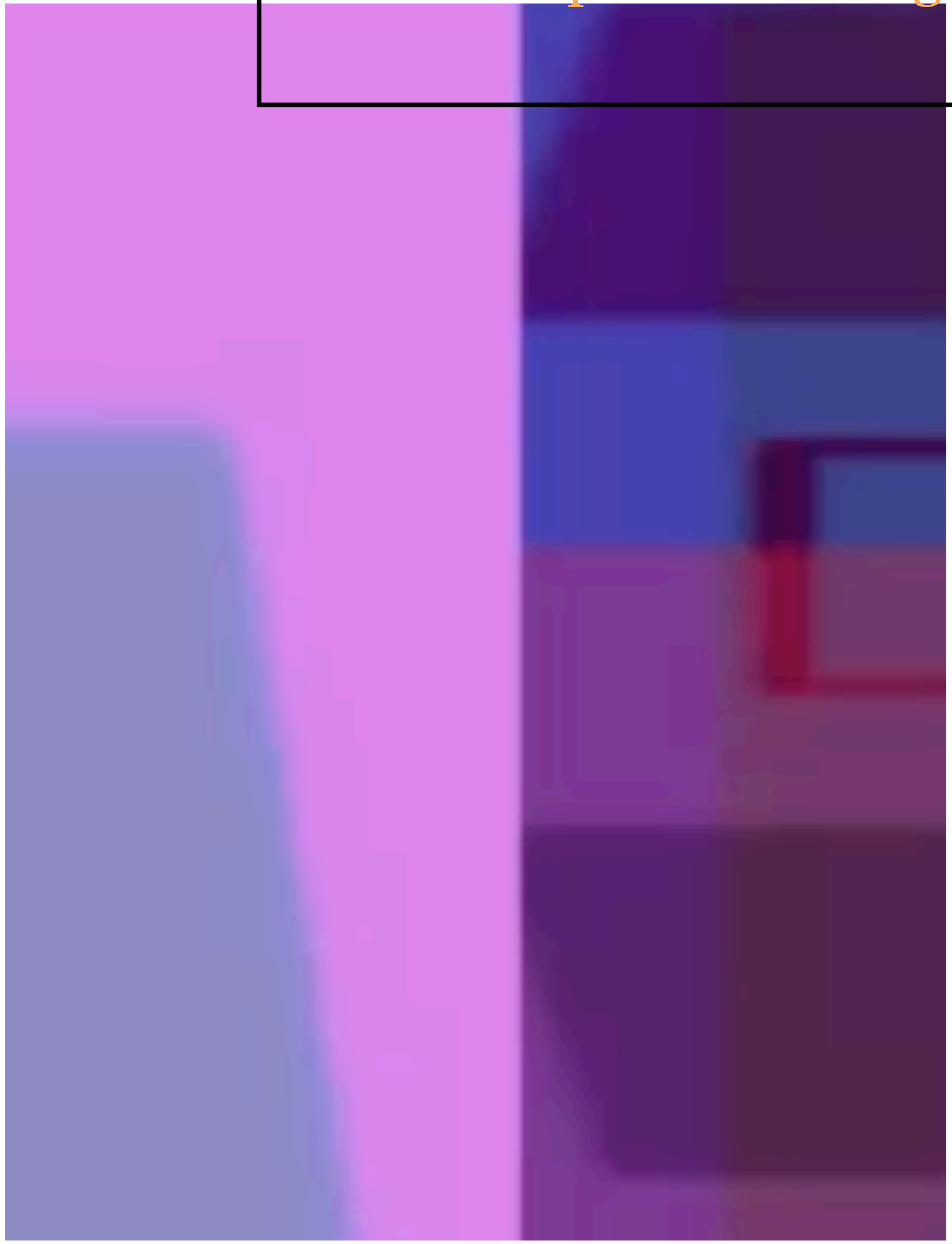
The behaviour is of artificial nature and the shapes that comprise the image are trapezium, rectangles (both filled and unfilled). It has more than 6 colours in total of selected shapes in the image.



CASE 4: STRIPE 6

PARTICIPANT IMAGE

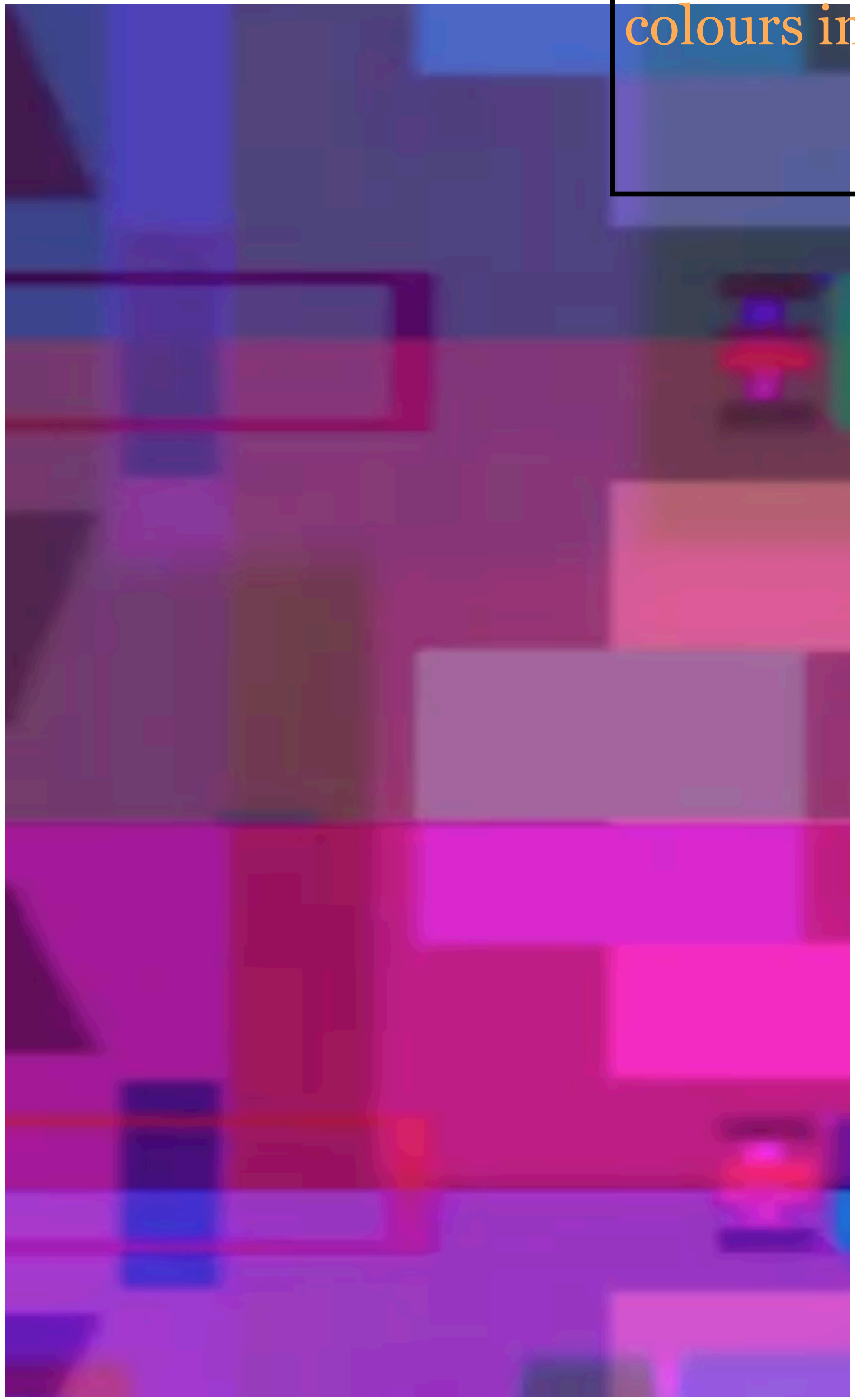
The behaviour is of artificial nature and the shapes that comprise the image are 3 truncated trapeziums and 6 rectangles:filled and filled (9 in all) . It has 10 colours in total of selected shapes in the image.



CASE 5: STRIPE 6

PARTICIPANT IMAGE

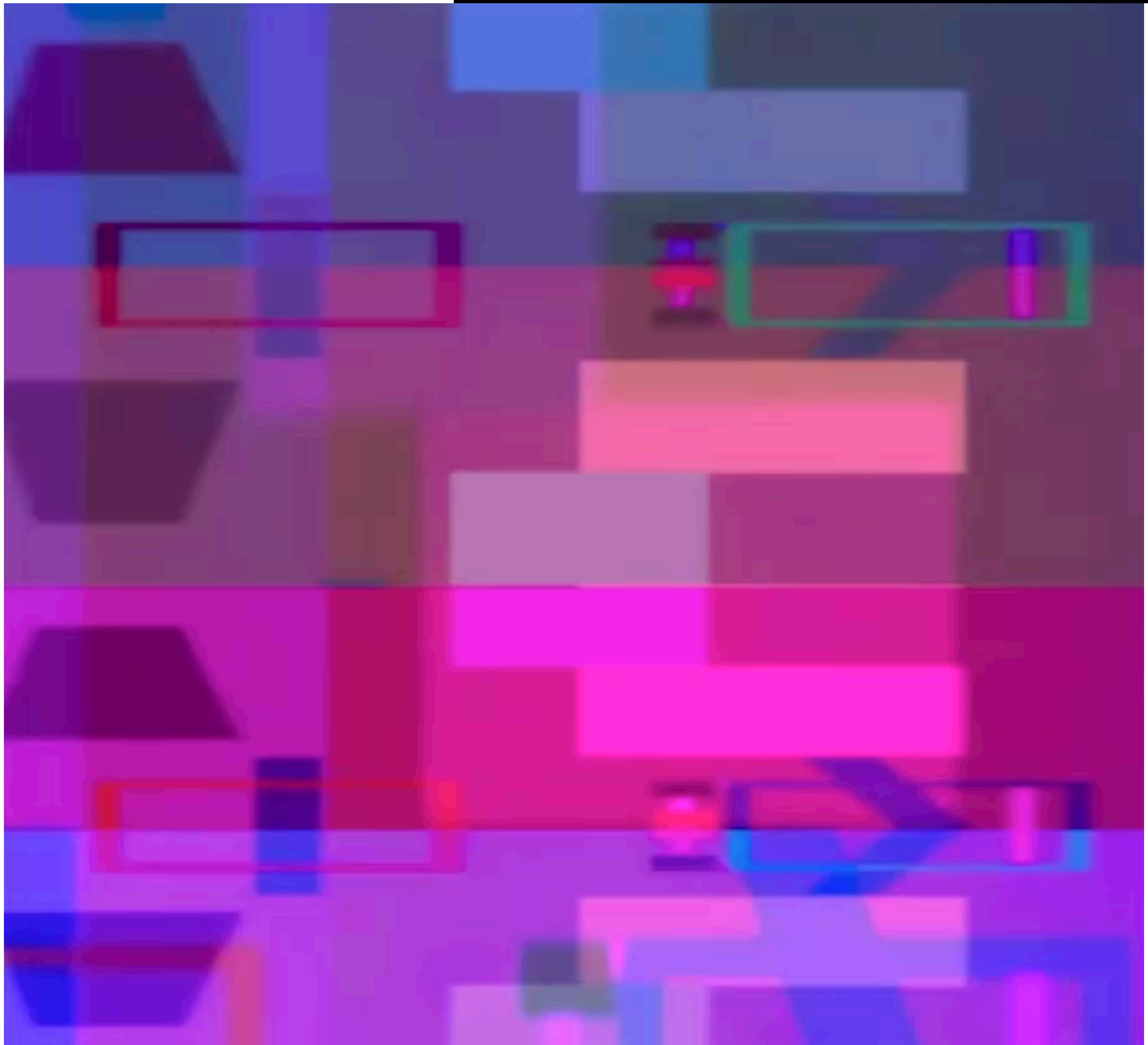
The behaviour is of artificial nature and the shapes that comprise the image are truncated trapeziums and both filled and unfilled rectangles. It has more than 6 colours in total of selected shapes in the image.



CASE 6: STRIPE 6

PARTICIPANT IMAGE

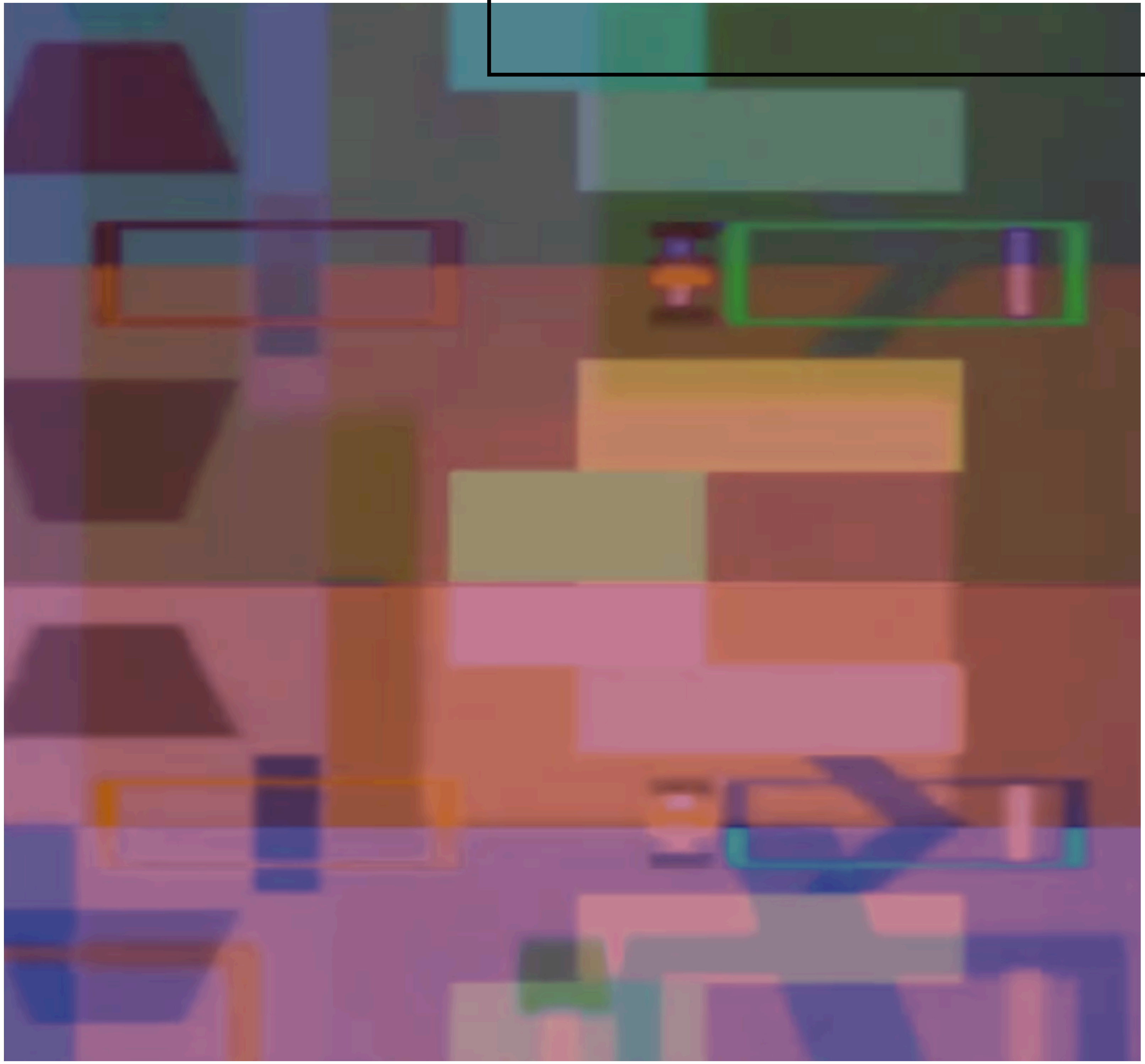
The behaviour is of artificial nature and the shapes that comprise the image are 4 trapeziums and more than 10 unfilled/filled rectangles. It has more than 10 colours in total of selected shapes in the image.



CASE 7: STRIPE 6

PARTICIPANT IMAGE

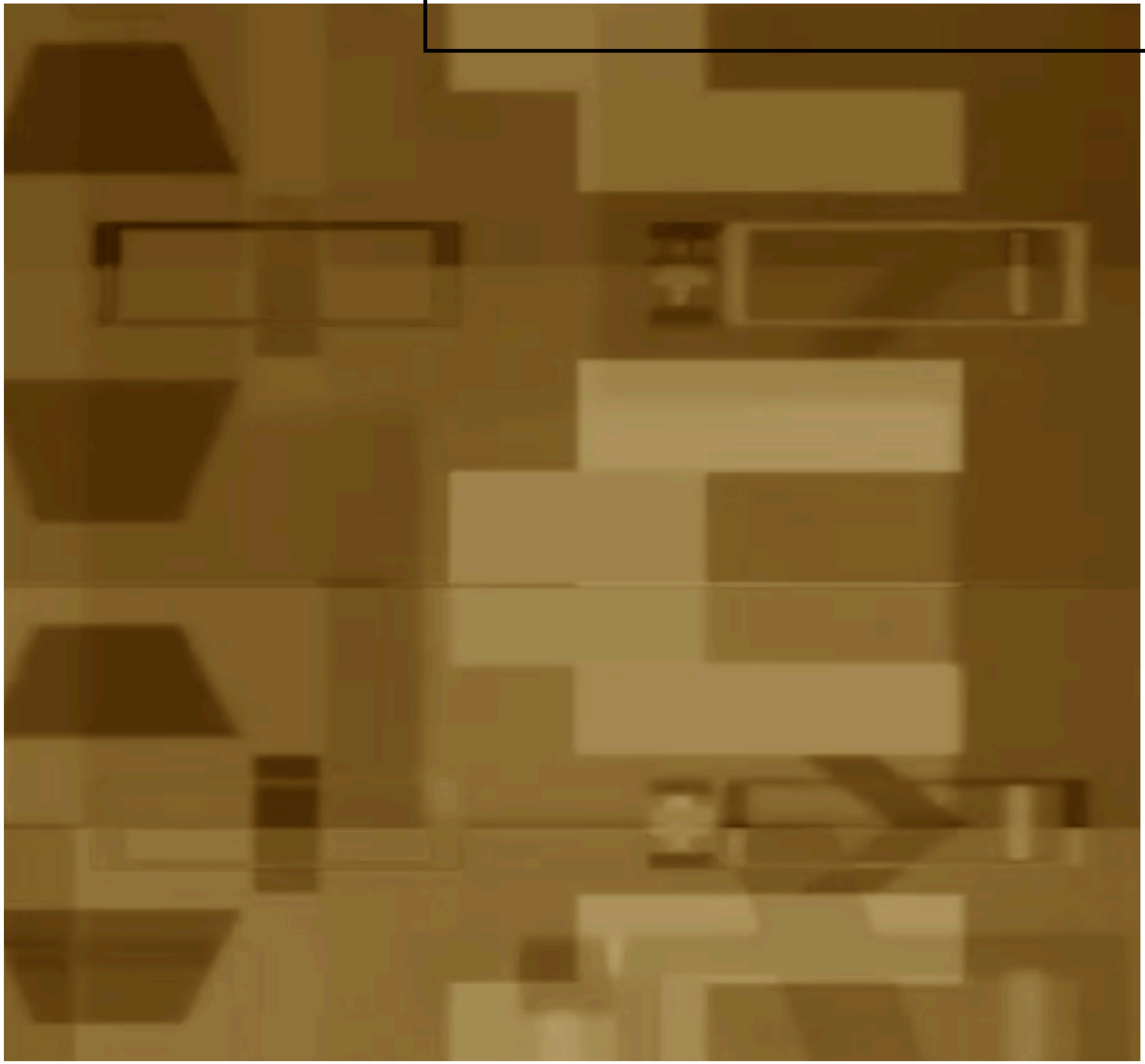
The behaviour is of artificial nature and the shapes that comprise the image are similar to case 6:stripe 6 but different colour adjustment is applied.



CASE 8: STRIPE 6

PARTICIPANT IMAGE

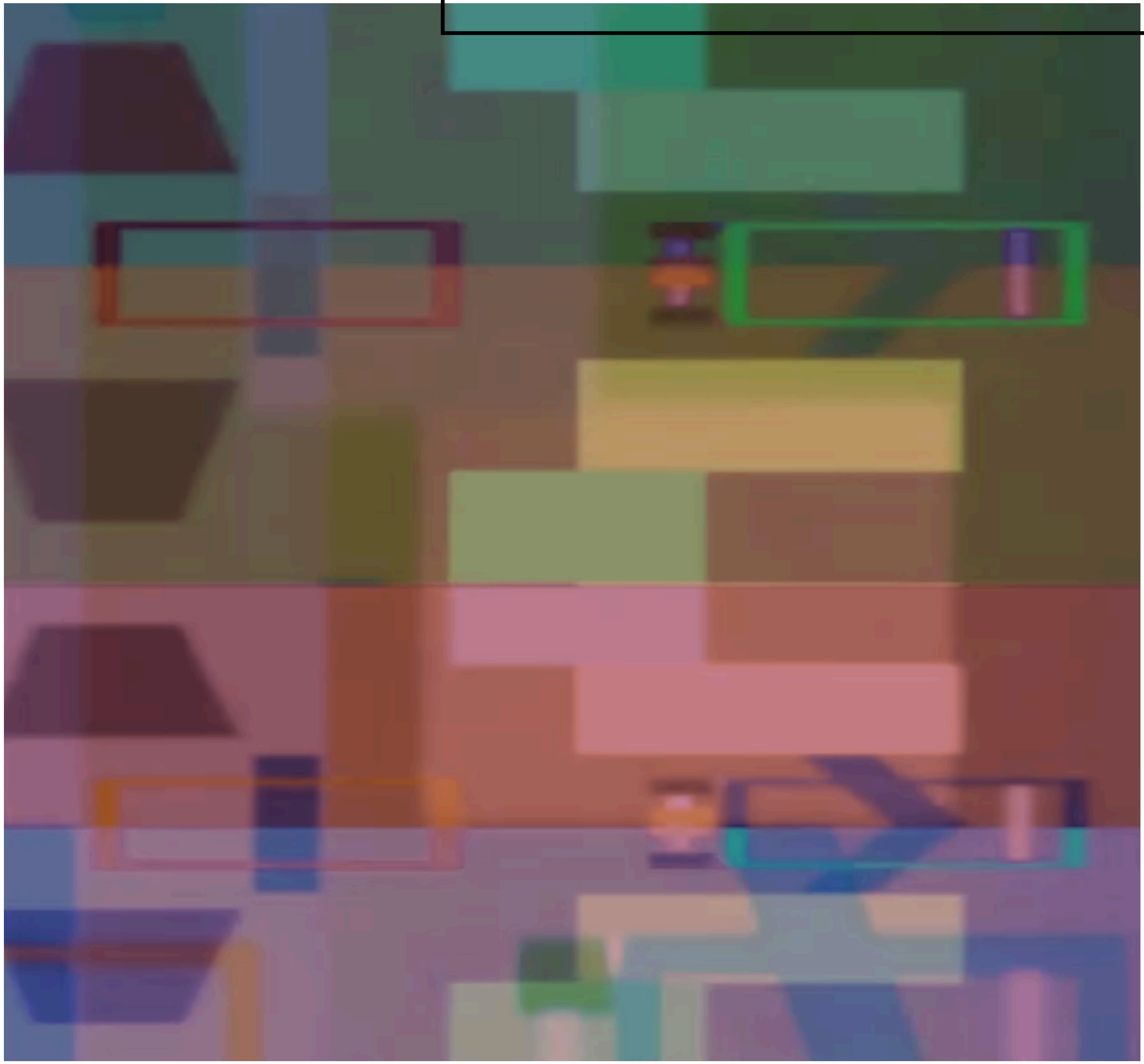
The behaviour is of artificial nature and the shapes that comprise the image are similar to case 7:stripe 6 but different colour adjustment is applied.



CASE 9: STRIPE 6

PARTICIPANT IMAGE

The behaviour is of artificial nature and the shapes that comprise the image are similar to case 8:stripe 6 but different colour adjustment is applied.



Stripe 7

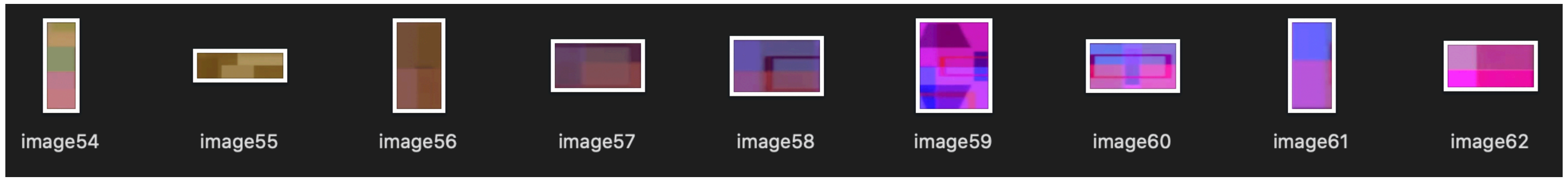


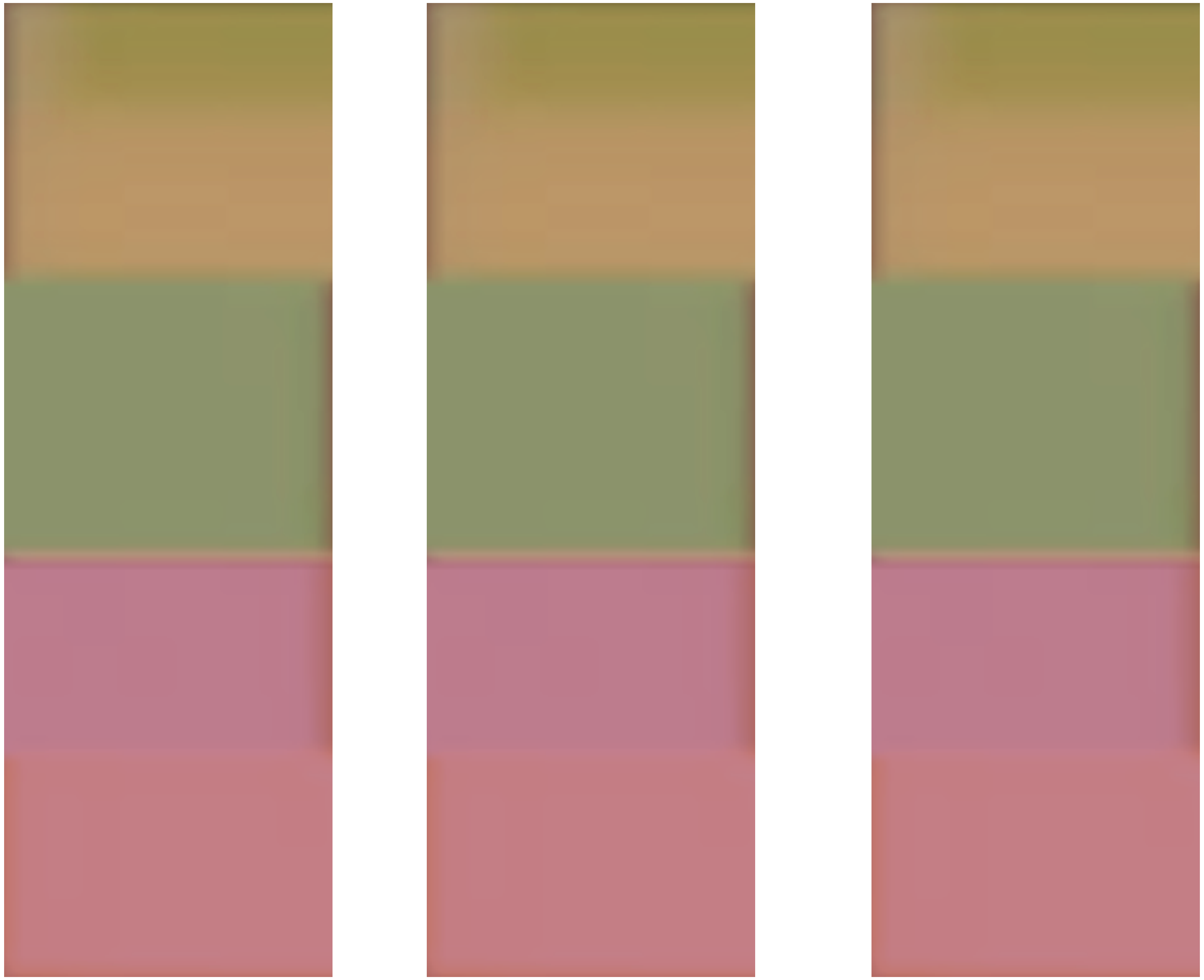
image54
image55
image56
image57
image58
image59
image60
image61
image62

There are about 9 participant images in this experimental group with its variable, 7. The case-level of participation images is from 55 to 62. The control group has 53 un-participant images that are not selected. It uses several image identity in proximity.

CASE 1: STRIPE 7

PARTICIPANT IMAGE

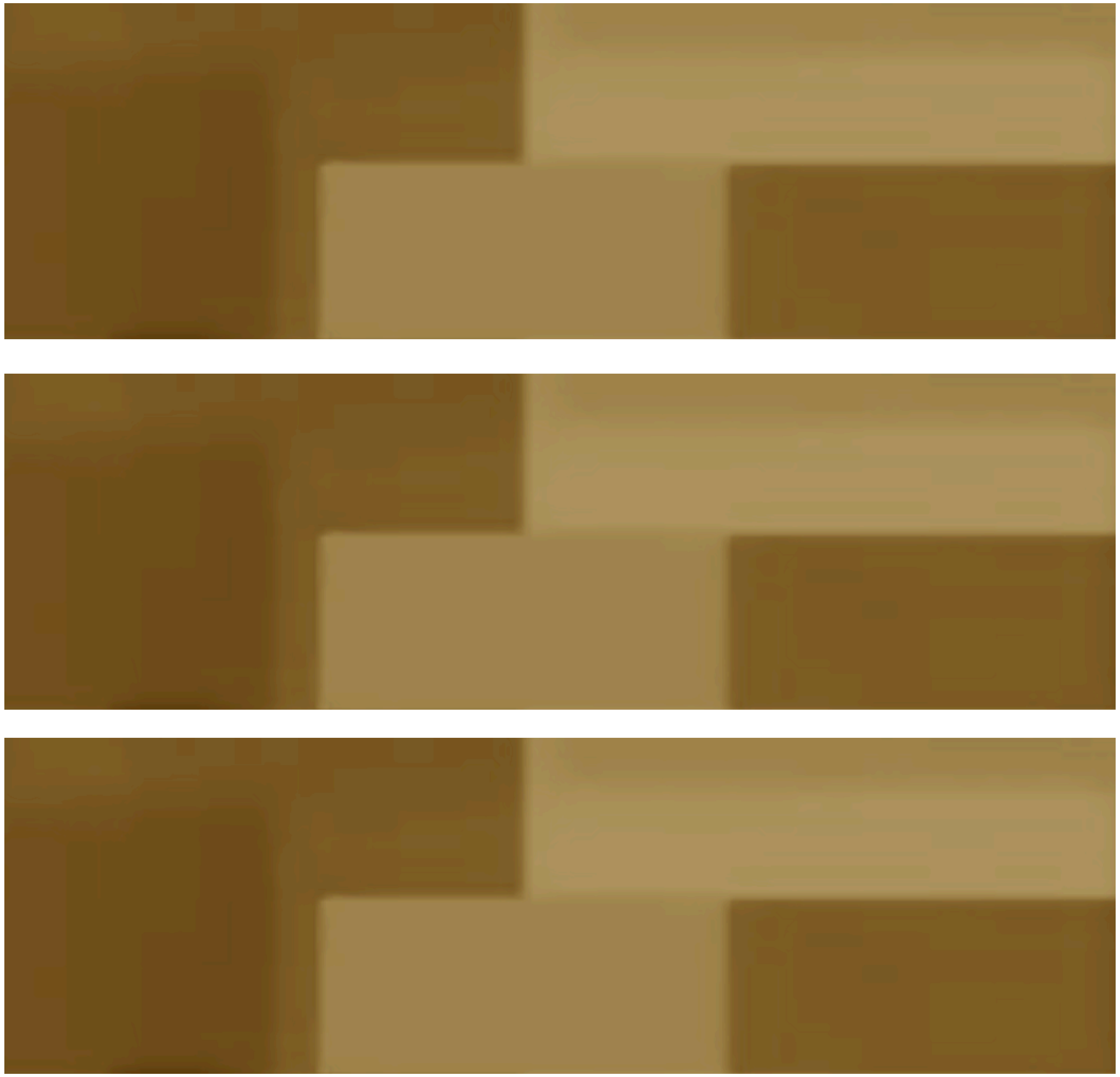
The behaviour is of artificial nature and the shape that comprise the image is rectangle of three colour variations.



CASE 2: STRIPE 7

PARTICIPANT IMAGE

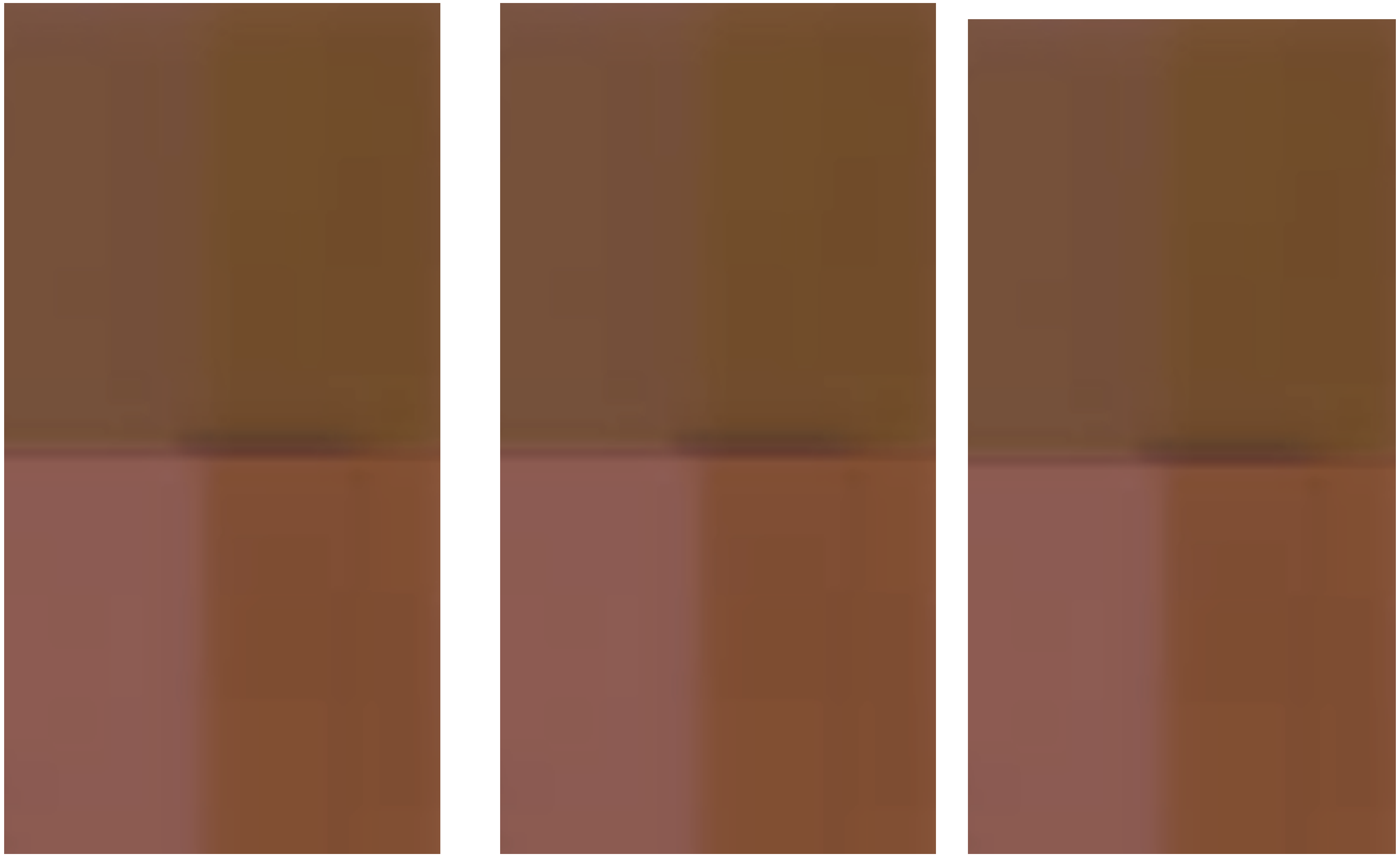
The behaviour is of artificial nature and the shapes that comprise the image are 5 rectangles of five colour variations.



CASE 3: STRIPE 7

PARTICIPANT IMAGE

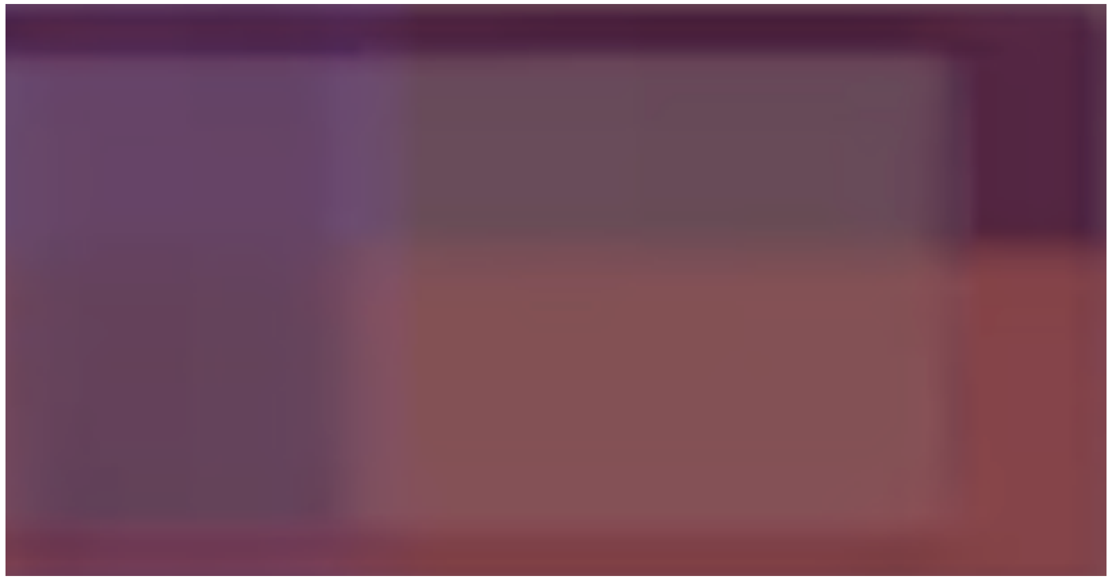
The behaviour is of artificial nature and the shape that comprise the image is rectangle (4 in number) of four colour variations.



CASE 4: STRIPE 7

PARTICIPANT IMAGE

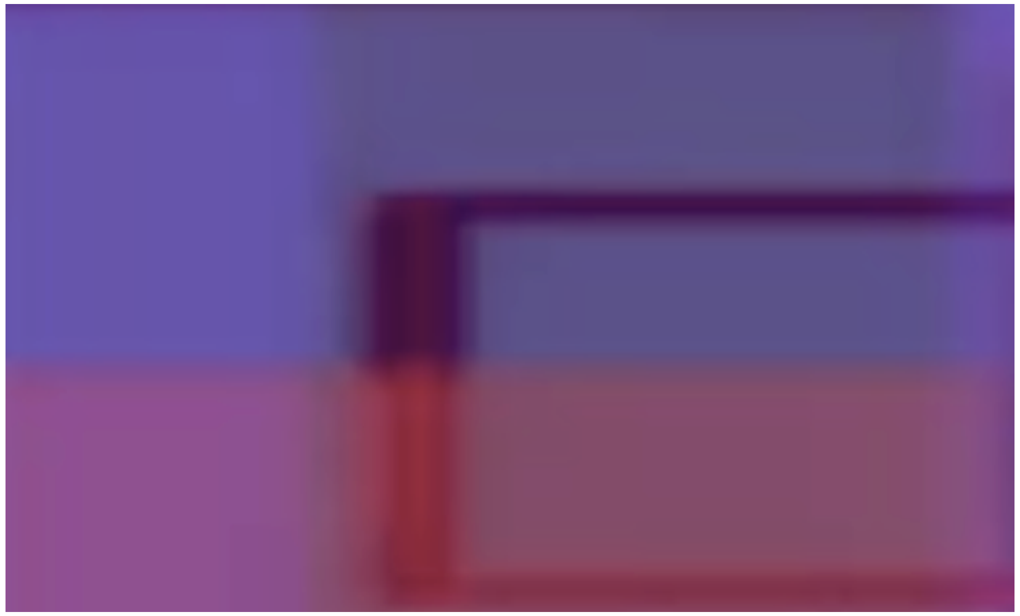
The behaviour is of artificial nature and the shape that comprise the image is rectangle (4 in number) of four colour variations.

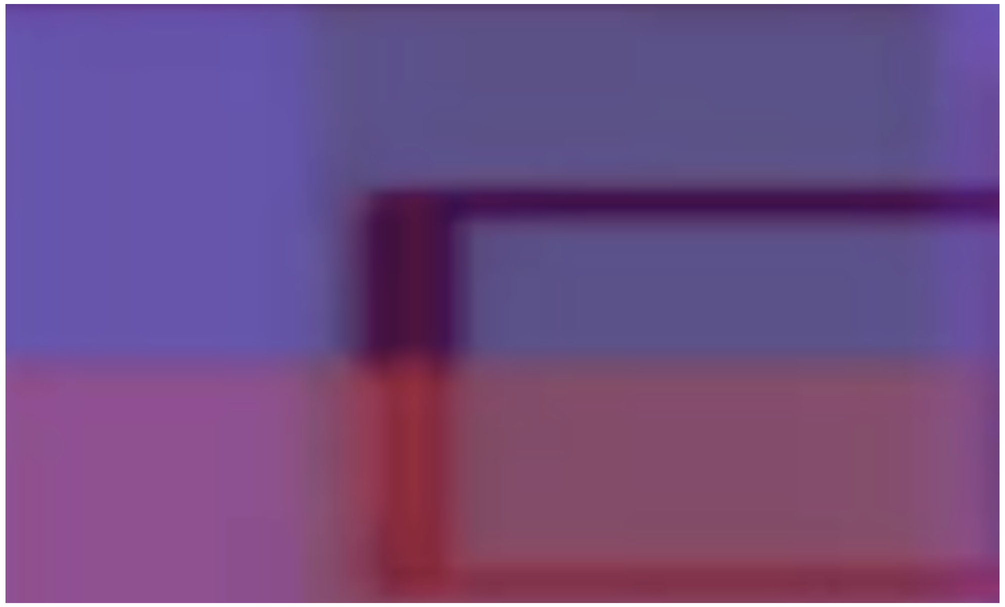


CASE 5: STRIPE 7

PARTICIPANT IMAGE

The behaviour is of artificial nature and the shape that comprise the image is rectangle (5 in number) of five colour variations.

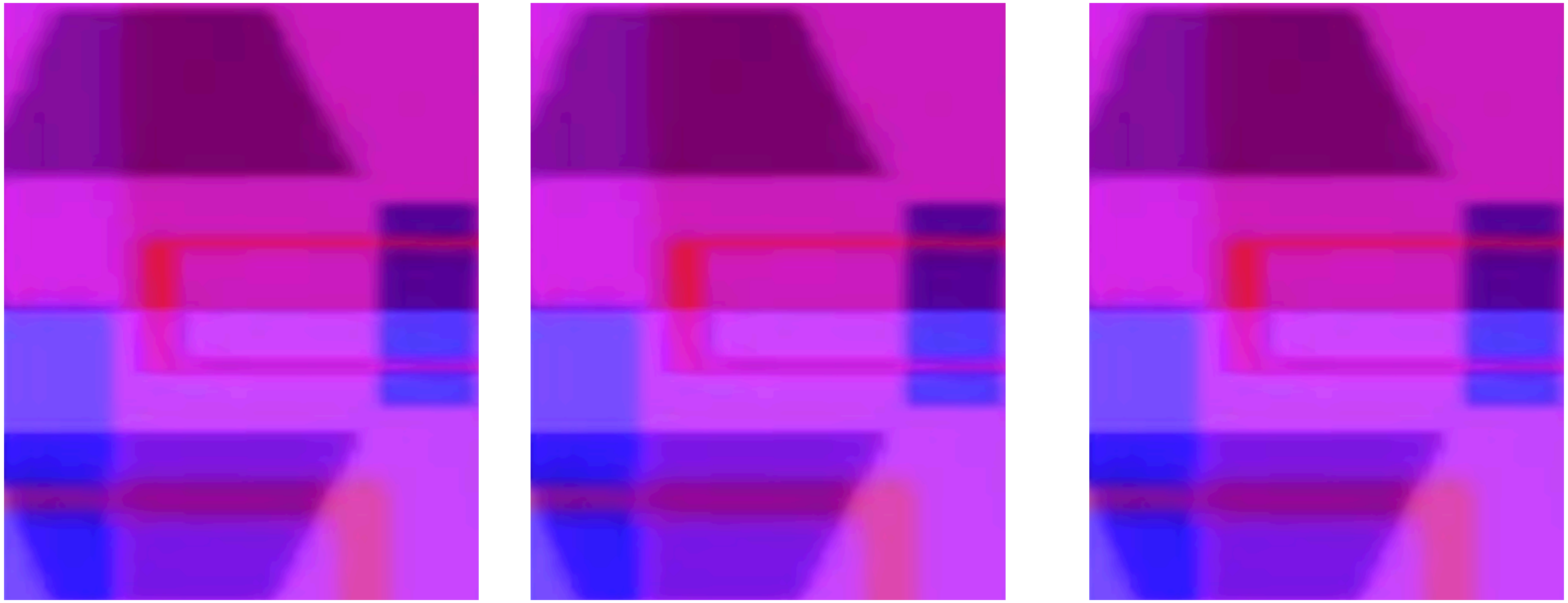




CASE 6: STRIPE 7

PARTICIPANT IMAGE

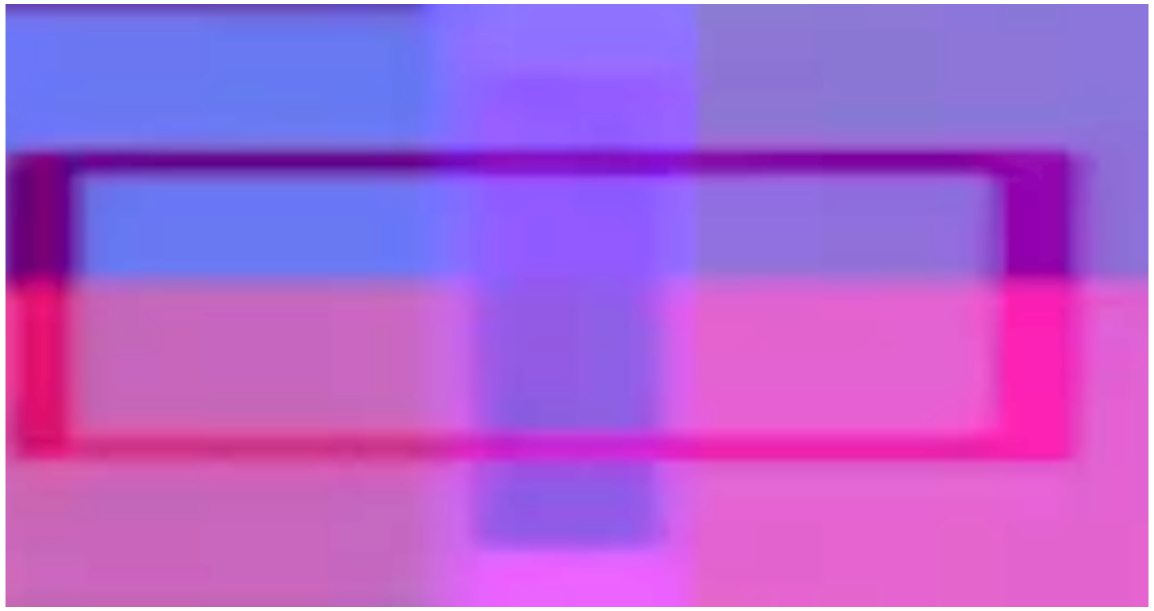
The behaviour is of artificial nature and the shapes that comprise the image are two trapeziums and rectangle (7 in number) of seven colour variations.

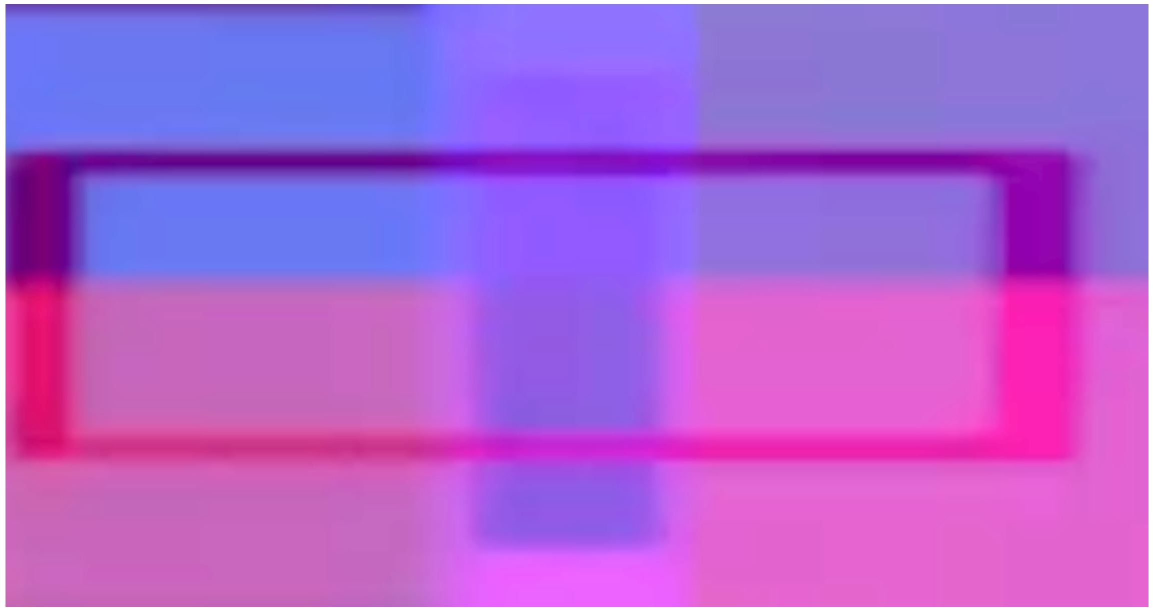


CASE 7: STRIPE 7

PARTICIPANT IMAGE

The behaviour is of artificial nature and the shapes that comprise the image is rectangle (7 in number) of seven colour variations.

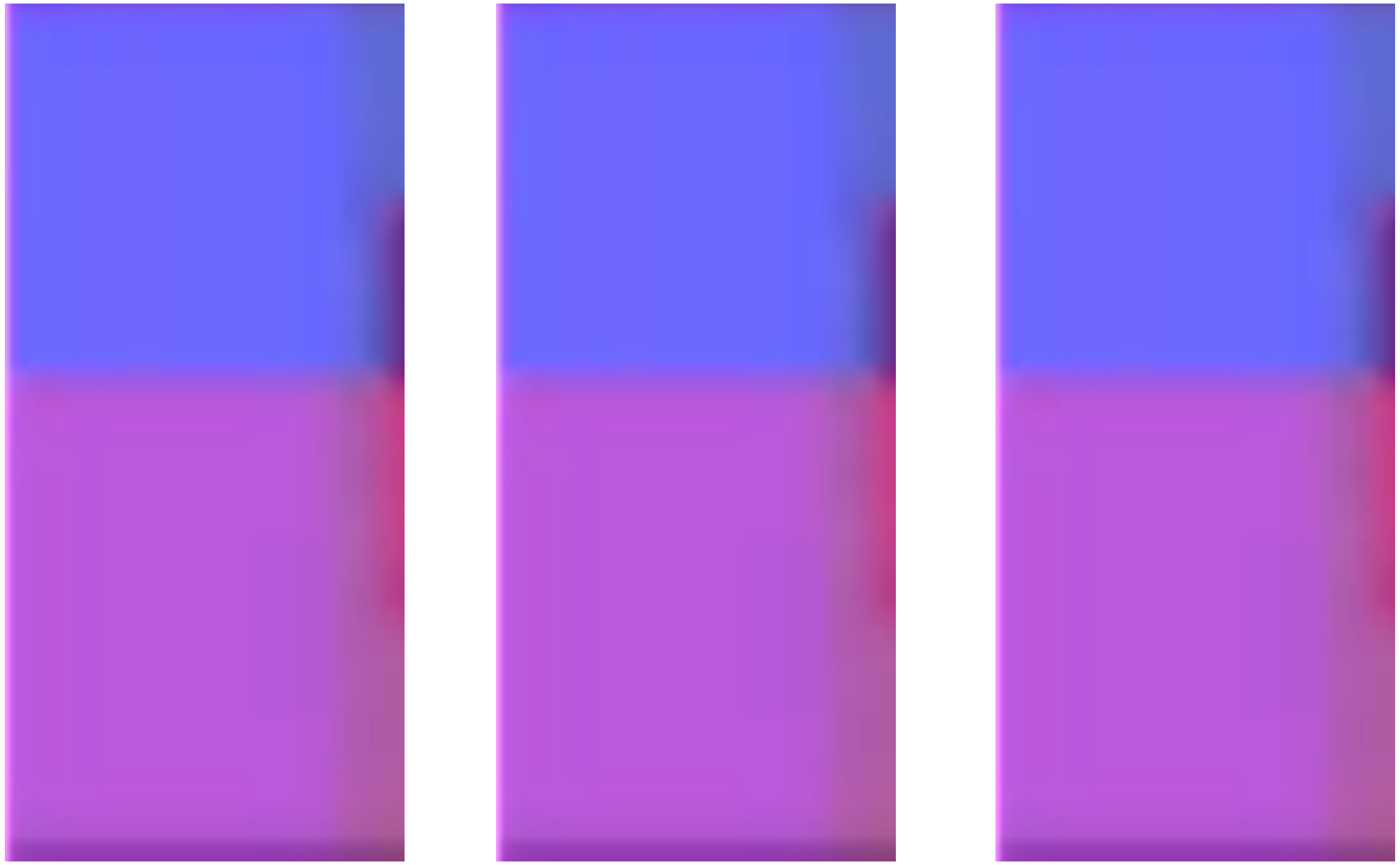




CASE 8: STRIPE 7

PARTICIPANT IMAGE

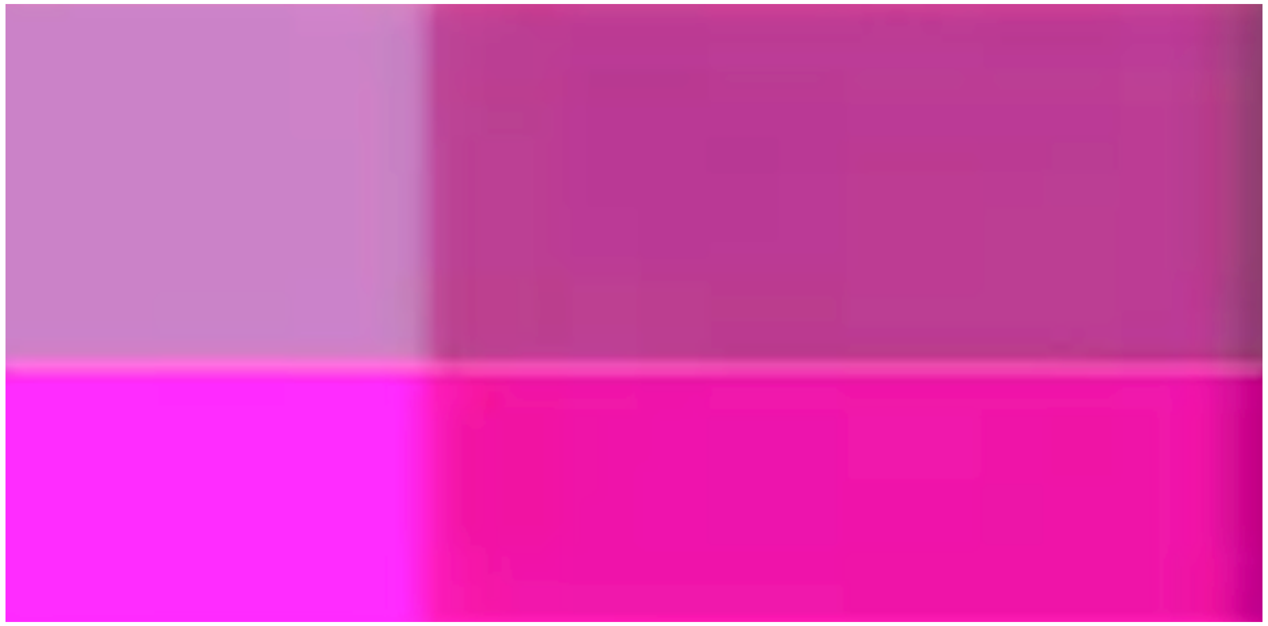
The behaviour is of artificial nature and the shape that comprise the image is rectangle(2 in number) of two colour variations.

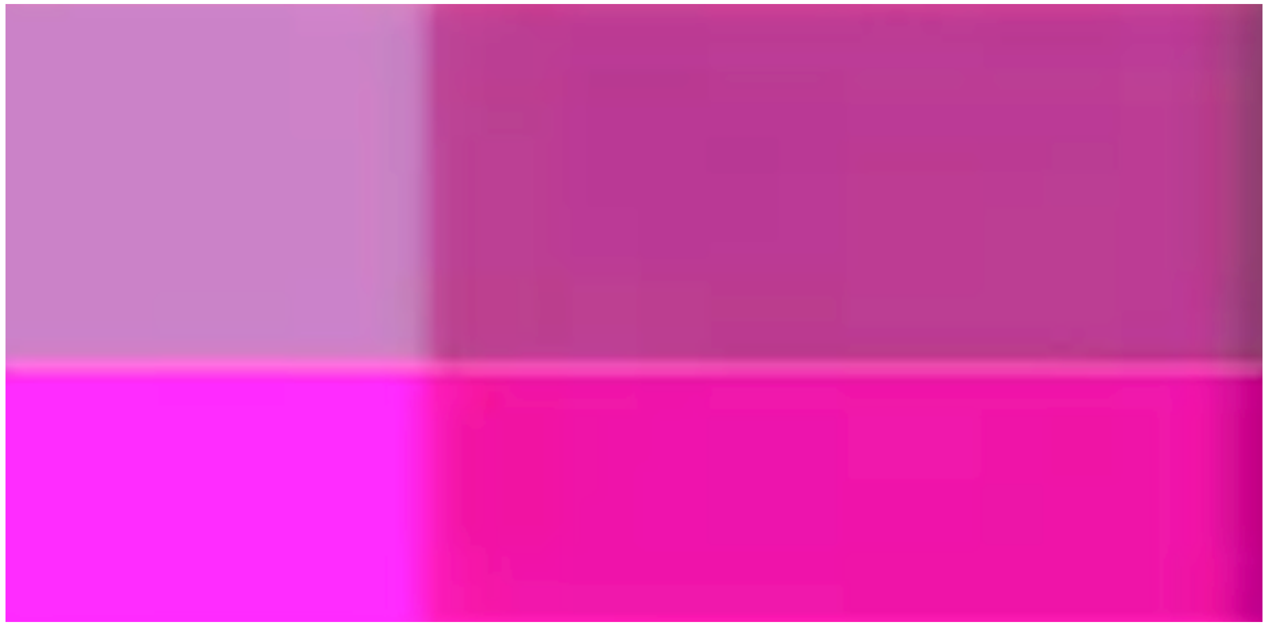


CASE 9: STRIPE 7

PARTICIPANT IMAGE

The behaviour is of artificial nature and the shape that comprise the image is rectangle (4 in number) of four colour variations.





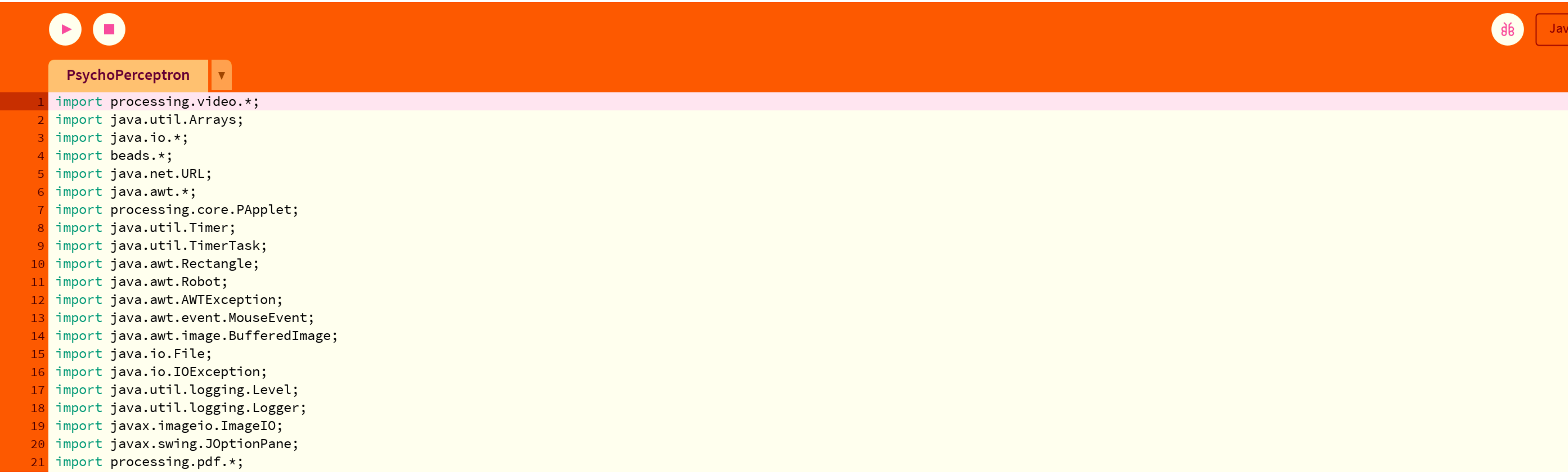
2. PROCESSING OF VISUAL MEMORY.

Processing uses three main methods:

1. **setup**()`; //where constructor are made, size, frame rate is set, loading images.
2. **draw**(); // main draw function of images, text, shapes.
3. **keyPressed**(); //key press is captured in this method, key=‘A’ || key=‘a’.

We will look at imports of packages then the three methods along with functions like arrow animation, sound playing, render and draw images……

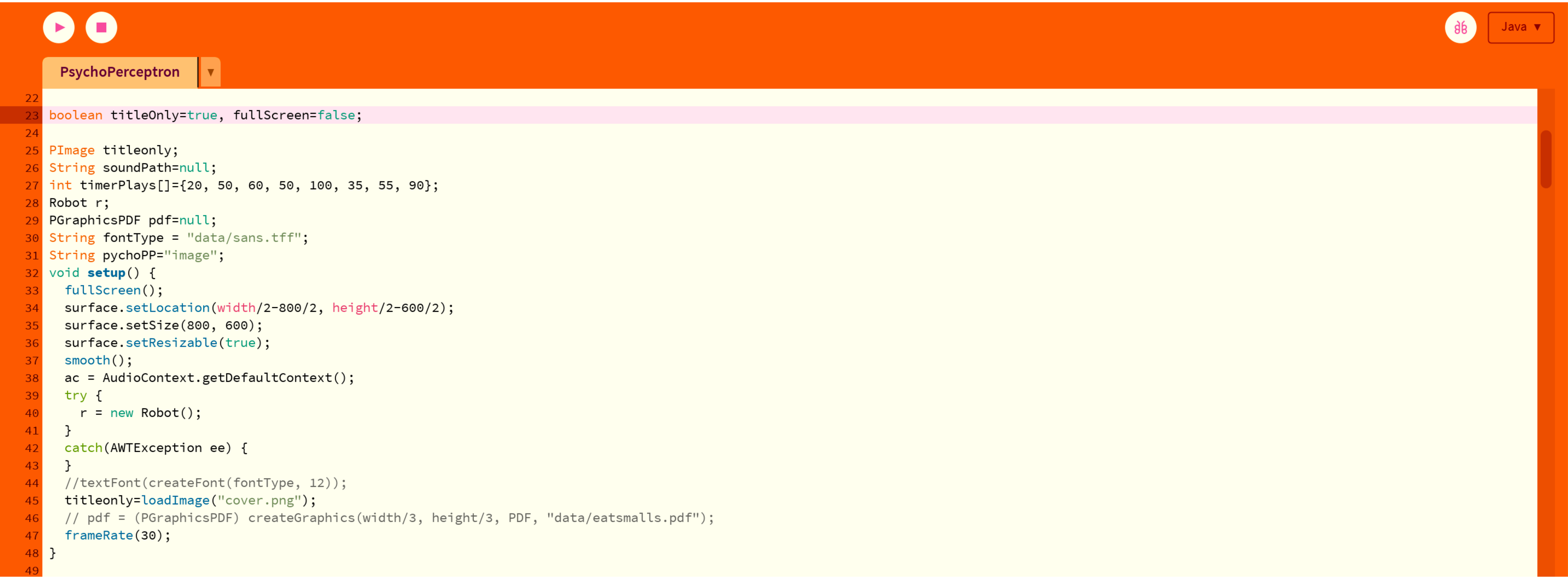
Import statements;



```
import processing.video.*;
import java.util.Arrays;
import java.io.*;
import beads.*;
import java.net.URL;
import java.awt.*;
import processing.core.PApplet;
import java.util.Timer;
import java.util.TimerTask;
import java.awt.Rectangle;
import java.awt.Robot;
import java.awt.AWTException;
import java.awt.event.MouseEvent;
import java.awt.image.BufferedImage;
import java.io.File;
import java.io.IOException;
import java.util.logging.Level;
import java.util.logging.Logger;
import javax.imageio.ImageIO;
import javax.swing.JOptionPane;
import processing.pdf.*;
```

Setup statements;

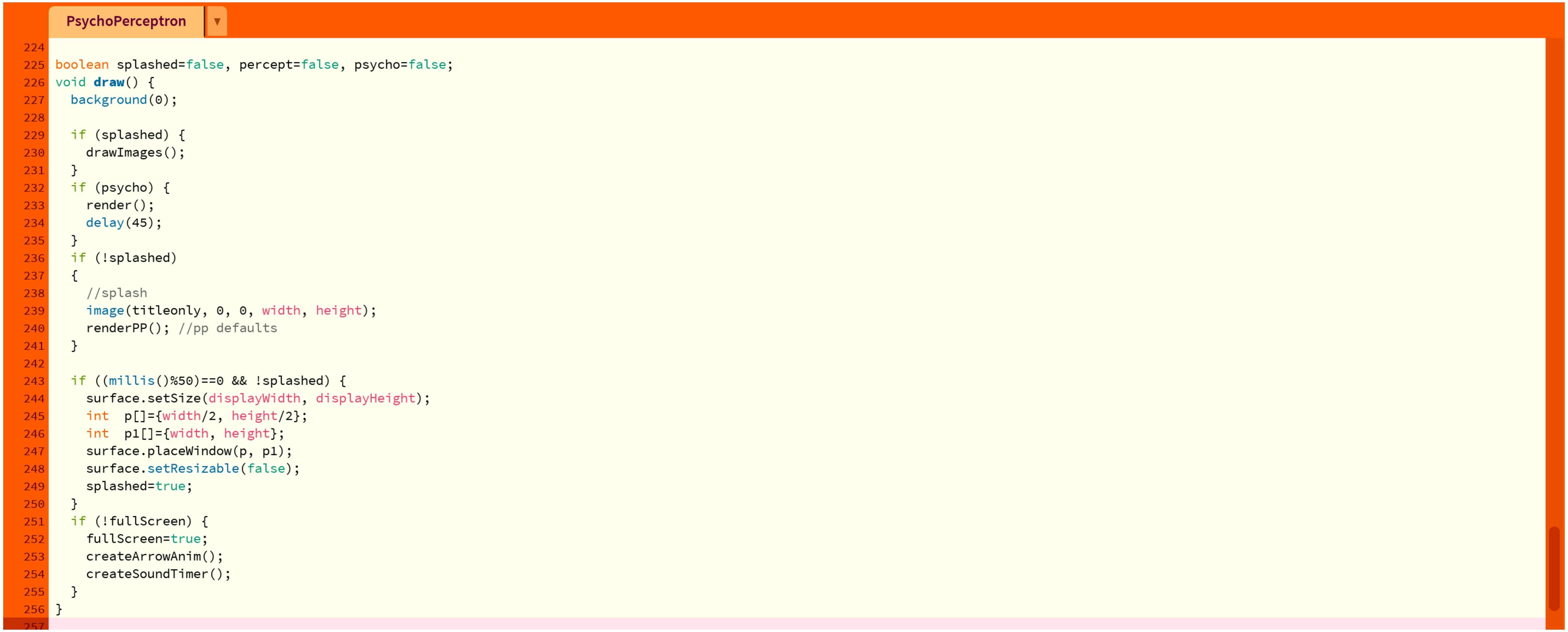
Line 33 states a fullscreen GUI which should located at the center with dimensions 800x800 and should be resizable afterwards. Smooth GUI surface is desired in this instance. Audio context is assigned with the default context. Robot construction is supposed to be used for screen capturing but not really used in the processing.



```
22
23 boolean titleOnly=true, fullScreen=false;
24
25 PImage titleonly;
26 String soundPath=null;
27 int timerPlays[]={20, 50, 60, 50, 100, 35, 55, 90};
28 Robot r;
29 PGraphicsPDF pdf=null;
30 String fontType = "data/sans.tff";
31 String pychoPP="image";
32 void setup() {
33   fullScreen();
34   surface.setLocation(width/2-800/2, height/2-600/2);
35   surface.setSize(800, 600);
36   surface.setResizable(true);
37   smooth();
38   ac = AudioContext.getDefaultContext();
39   try {
40     r = new Robot();
41   }
42   catch(AWTException ee) {
43   }
44   //textFont(createFont(fontType, 12));
45   titleonly=loadImage("cover.png");
46   // pdf = (PGraphicsPDF) createGraphics(width/3, height/3, PDF, "data/eatsmalls.pdf");
47   frameRate(30);
48 }
49
```

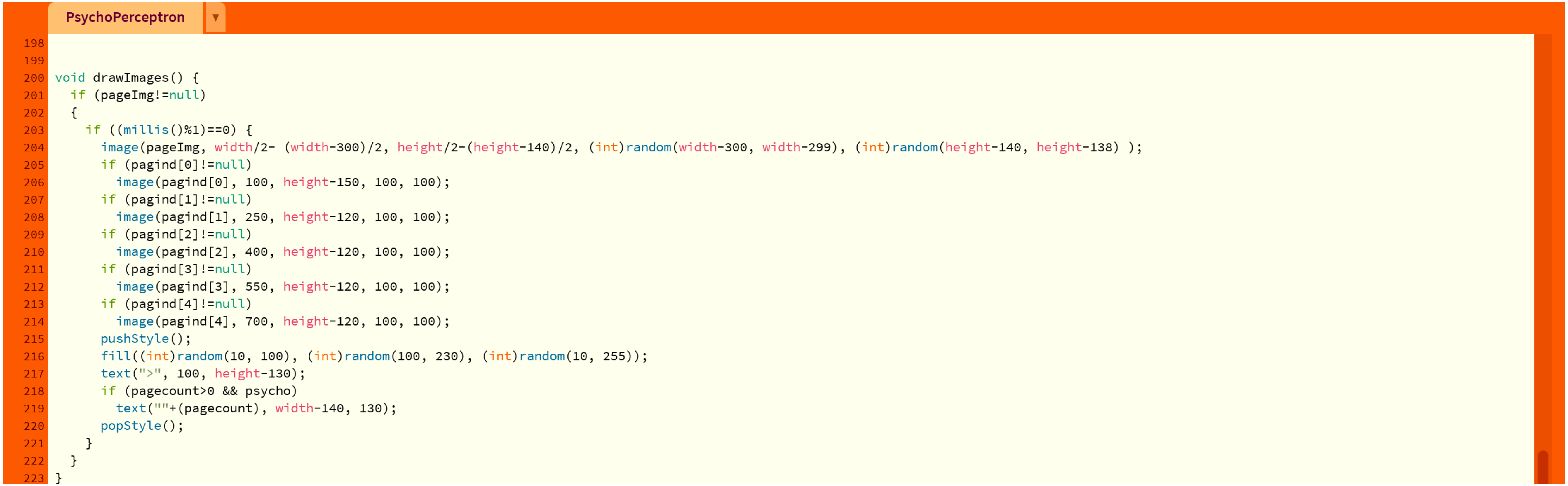
Draw method;

It sets the background to a black surface. It checks if splash screen is already active and showing then it draw images in the rendering pipeline. It definitely render if the psycho screen is set and enabled. If all these variables are not set then render the title splash screen only. Line 243 states that until 50 milliseconds and splash not showing set the splash surface to the center. If the full screen is not showing during splashing time, create an arrow animation timer and also a sound loop timer.



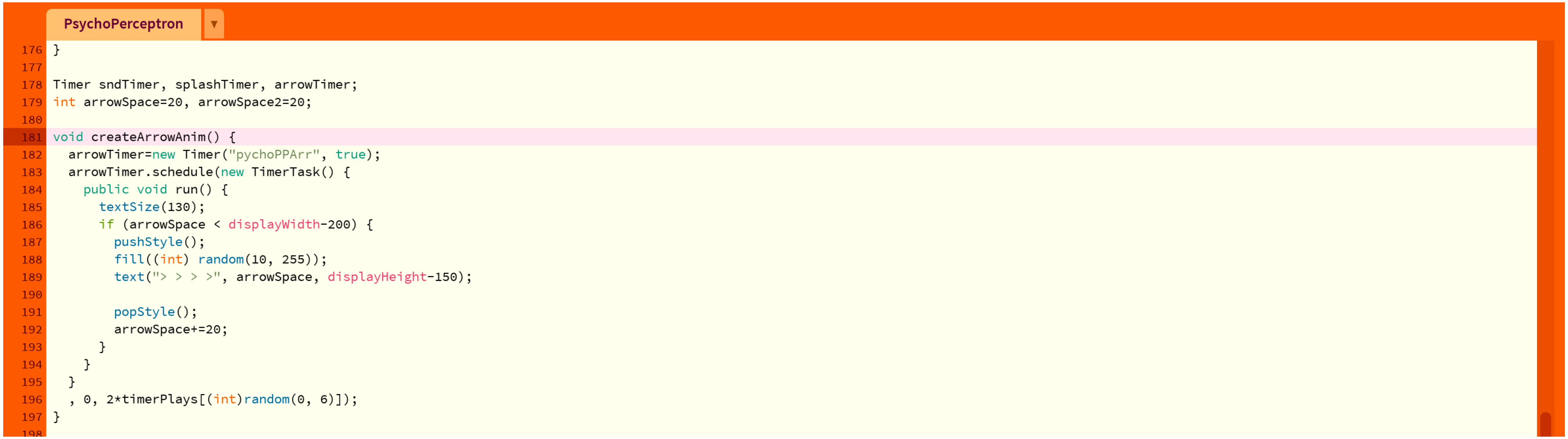
```
224
225 boolean splashed=false, percept=false, psycho=false;
226 void draw() {
227   background(0);
228
229   if (splashed) {
230     drawImages();
231   }
232   if (psycho) {
233     render();
234     delay(45);
235   }
236   if (!splashed)
237   {
238     //splash
239     image(titleonly, 0, 0, width, height);
240     renderPP(); //pp defaults
241   }
242
243   if ((millis()%50)==0 && !splashed) {
244     surface.setSize(displayWidth, displayHeight);
245     int  p[]={width/2, height/2};
246     int  p1[]={width, height};
247     surface.placeWindow(p, p1);
248     surface.setResizable(false);
249     splashed=true;
250   }
251   if (!fullScreen) {
252     fullScreen=true;
253     createArrowAnim();
254     createSoundTimer();
255   }
256 }
```

drawImages method;



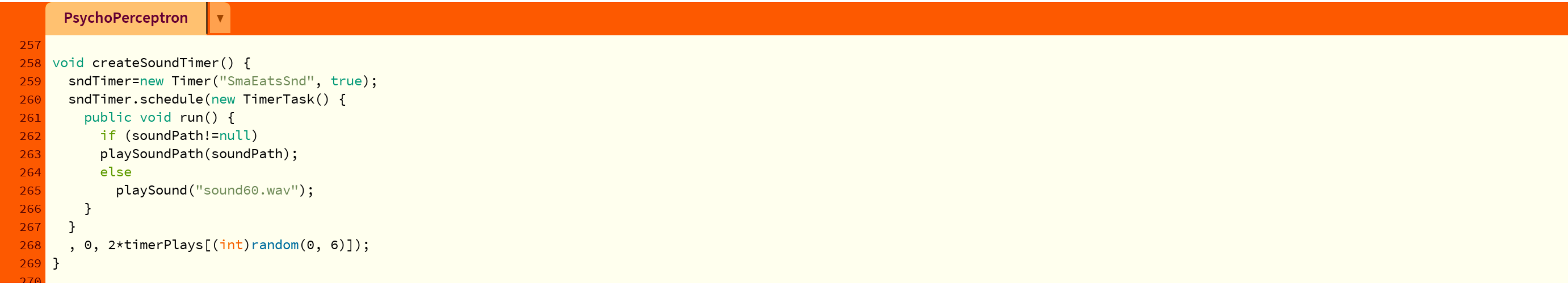
```
void drawImages() {
  if (pageImg!=null)
  {
    if ((millis()%1)==0) {
      image(pageImg, width/2- (width-300)/2, height/2-(height-140)/2, (int)random(width-300, width-299), (int)random(height-140, height-138) );
      if (pagind[0]!=null)
        image(pagind[0], 100, height-150, 100, 100);
      if (pagind[1]!=null)
        image(pagind[1], 250, height-120, 100, 100);
      if (pagind[2]!=null)
        image(pagind[2], 400, height-120, 100, 100);
      if (pagind[3]!=null)
        image(pagind[3], 550, height-120, 100, 100);
      if (pagind[4]!=null)
        image(pagind[4], 700, height-120, 100, 100);
      pushStyle();
      fill((int)random(10, 100), (int)random(100, 230), (int)random(10, 255));
      text(">", 100, height-130);
      if (pagecount>0 && psycho)
        text(""+(pagecount), width-140, 130);
      popStyle();
    }
  }
}
```

Create Arrow Timer method;



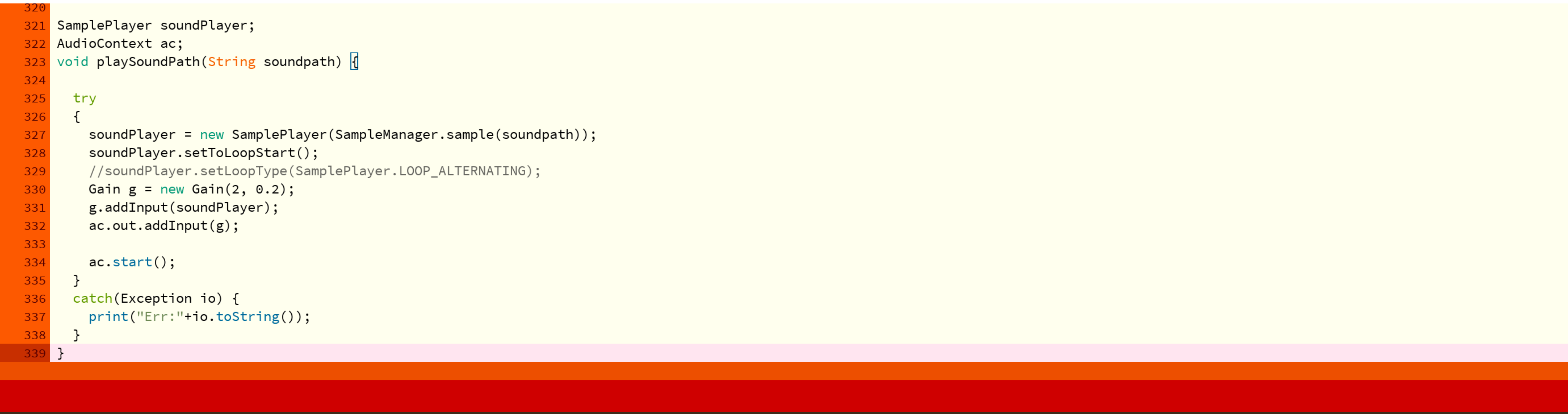
```
}

Timer sndTimer, splashTimer, arrowTimer;
int arrowSpace=20, arrowSpace2=20;

void createArrowAnim() {
  arrowTimer=new Timer("pychoPPArr", true);
  arrowTimer.schedule(new TimerTask() {
    public void run() {
      textSize(130);
      if (arrowSpace < displayWidth-200) {
        pushStyle();
        fill((int) random(10, 255));
        text("> > > >", arrowSpace, displayHeight-150);

        popStyle();
        arrowSpace+=20;
      }
    }
  }
  , 0, 2*timerPlays[(int)random(0, 6)]);
}
```

Create Sound Timer Method:



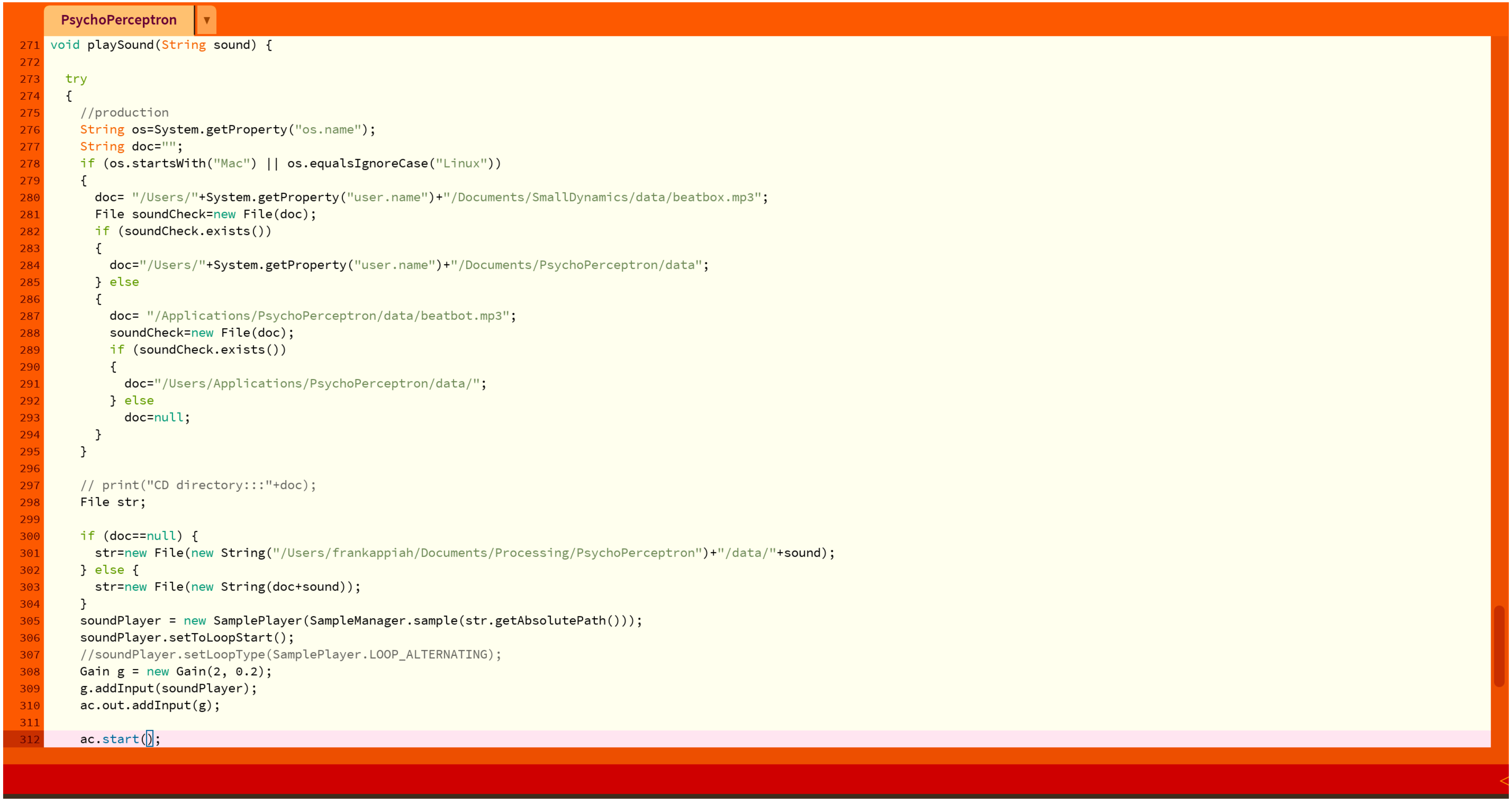
```
void createSoundTimer() {
  sndTimer=new Timer("SmaEatsSnd", true);
  sndTimer.schedule(new TimerTask() {
    public void run() {
      if (soundPath!=null)
      playSoundPath(soundPath);
      else
        playSound("sound60.wav");
    }
  }
  , 0, 2*timerPlays[(int)random(0, 6)]);
}
```

Play Sound Path Method:



```

SamplePlayer soundPlayer;
AudioContext ac;
void playSoundPath(String soundpath) {

  try
  {
    soundPlayer = new SamplePlayer(SampleManager.sample(soundpath));
    soundPlayer.setToLoopStart();
    //soundPlayer.setLoopType(SamplePlayer.LOOP_ALTERNATING);
    Gain g = new Gain(2, 0.2);
    g.addInput(soundPlayer);
    ac.out.addInput(g);

    ac.start();
  }
  catch(Exception io) {
    print("Err:"+io.toString());
  }
}
```

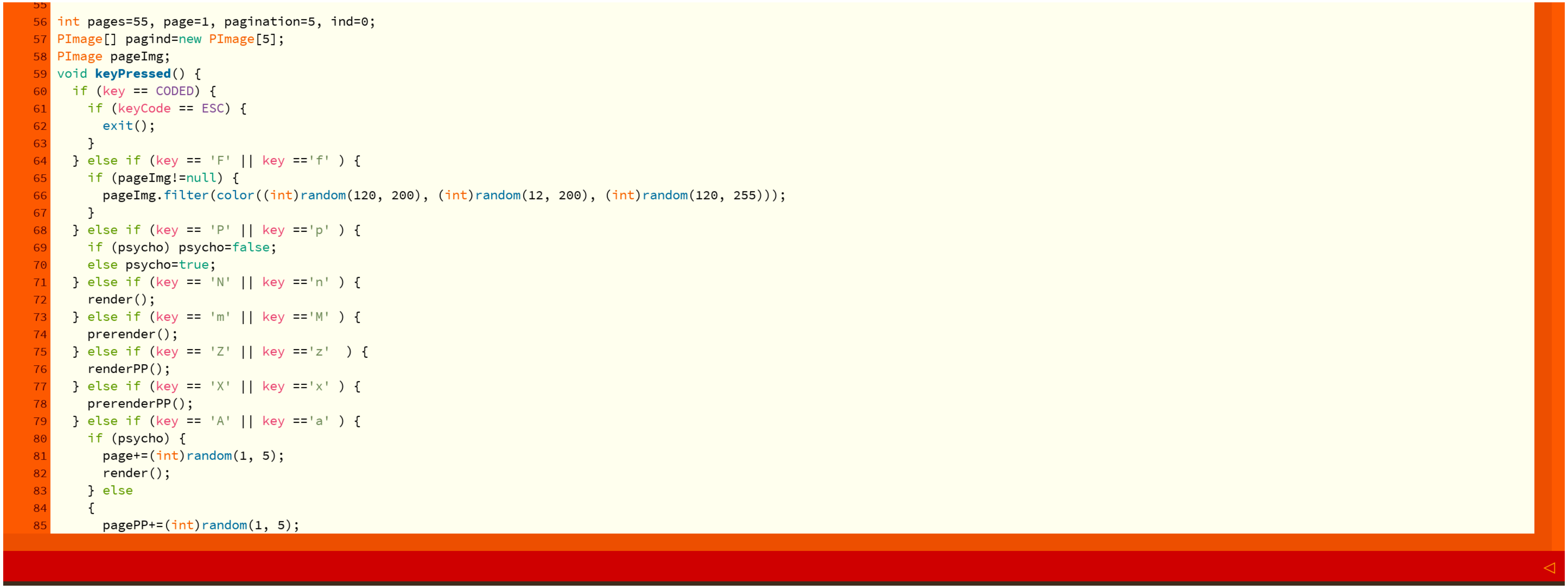
Play Sound Method:



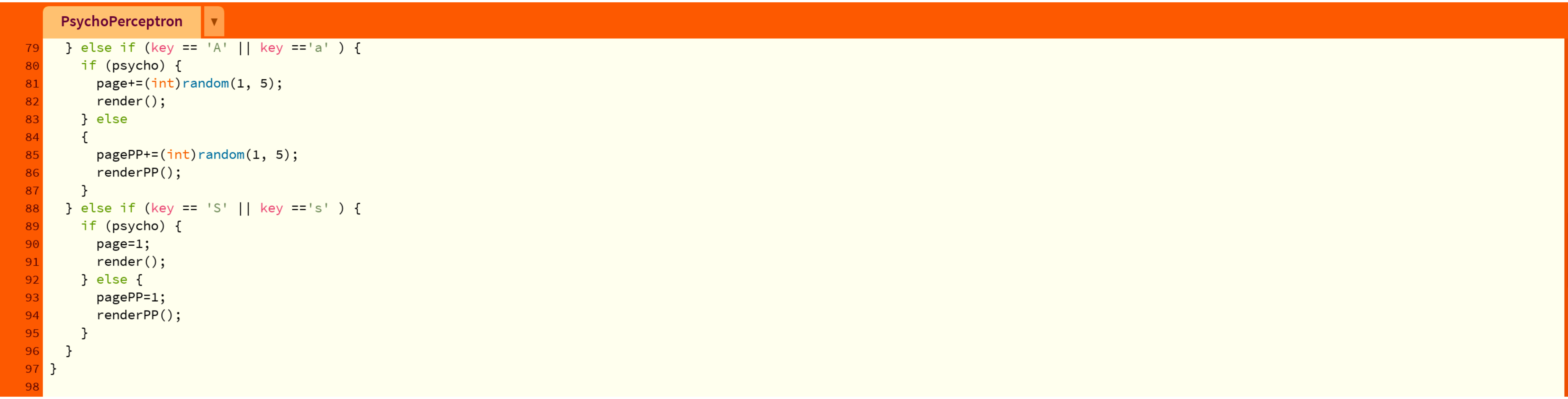
```
void playSound(String sound) {

  try
  {
    //production
    String os=System.getProperty("os.name");
    String doc="";
    if (os.startsWith("Mac") || os.equalsIgnoreCase("Linux"))
    {
      doc= "/Users/"+System.getProperty("user.name")+"/Documents/SmallDynamics/data/beatbox.mp3";
      File soundCheck=new File(doc);
      if (soundCheck.exists())
      {
        doc="/Users/"+System.getProperty("user.name")+"/Documents/PsychoPerceptron/data";
      } else
      {
        doc= "/Applications/PsychoPerceptron/data/beatbot.mp3";
        soundCheck=new File(doc);
        if (soundCheck.exists())
        {
          doc="/Users/Applications/PsychoPerceptron/data/";
        } else
          doc=null;
      }
    }

    // print("CD directory:::"+doc);
    File str;

    if (doc==null) {
      str=new File(new String("/Users/frankappiah/Documents/Processing/PsychoPerceptron")+"/data/"+sound);
    } else {
      str=new File(new String(doc+sound));
    }
    soundPlayer = new SamplePlayer(SampleManager.sample(str.getAbsolutePath()));
    soundPlayer.setToLoopStart();
    //soundPlayer.setLoopType(SamplePlayer.LOOP_ALTERNATING);
    Gain g = new Gain(2, 0.2);
    g.addInput(soundPlayer);
    ac.out.addInput(g);

    ac.start();
```

keyPressed method;

Application will exit when the escape key is pressed. Key F is an applied colour filter of random RGB values R is randomised on range 120 to 200, G randomised on range 12 to 200 and B is randomised on range 120 to 255. Key P will enable a psycho screen showing and it is like a toggle switch. Key n will render a participant image in current position. Key M will render a participant image in previous position. Key Z is psycho perceptron image render for pages in document in current position and Key X for the previous position. Key A is randomised step function from current +1 to current+5 participant or psycho images.

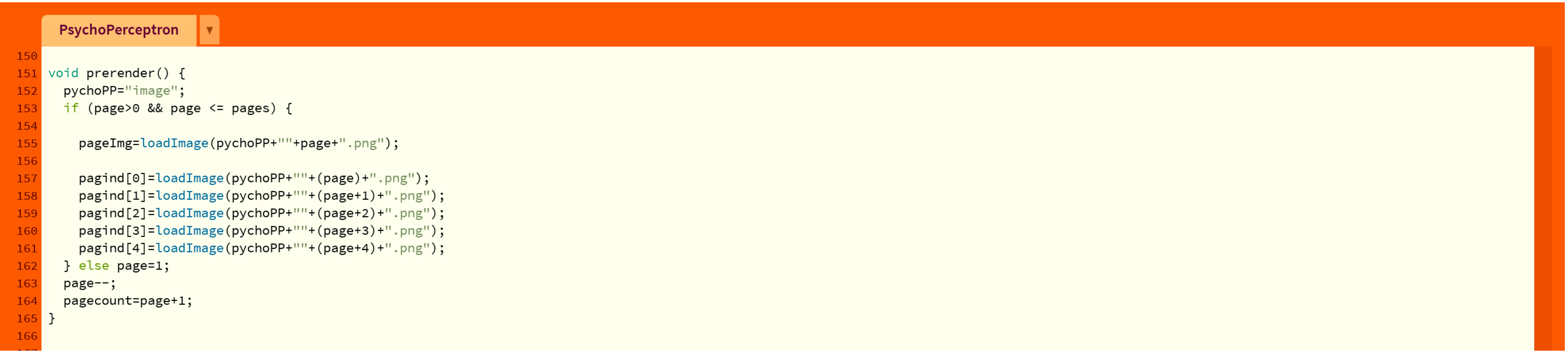


```
int pages=55, page=1, pagination=5, ind=0;
PImage[] pagind=new PImage[5];
PImage pageImg;
void keyPressed() {
  if (key == CODED) {
    if (keyCode == ESC) {
      exit();
    }
  } else if (key == 'F' || key =='f' ) {
    if (pageImg!=null) {
      pageImg.filter(color((int)random(120, 200), (int)random(12, 200), (int)random(120, 255)));
    }
  } else if (key == 'P' || key =='p' ) {
    if (psycho) psycho=false;
    else psycho=true;
  } else if (key == 'N' || key =='n' ) {
    render();
  } else if (key == 'm' || key =='M' ) {
    prerender();
  } else if (key == 'Z' || key =='z'  ) {
    renderPP();
  } else if (key == 'X' || key =='x' ) {
    prerenderPP();
  } else if (key == 'A' || key =='a' ) {
    if (psycho) {
      page+=(int)random(1, 5);
      render();
    } else
    {
      pagePP+=(int)random(1, 5);
```


PsychoPerceptron

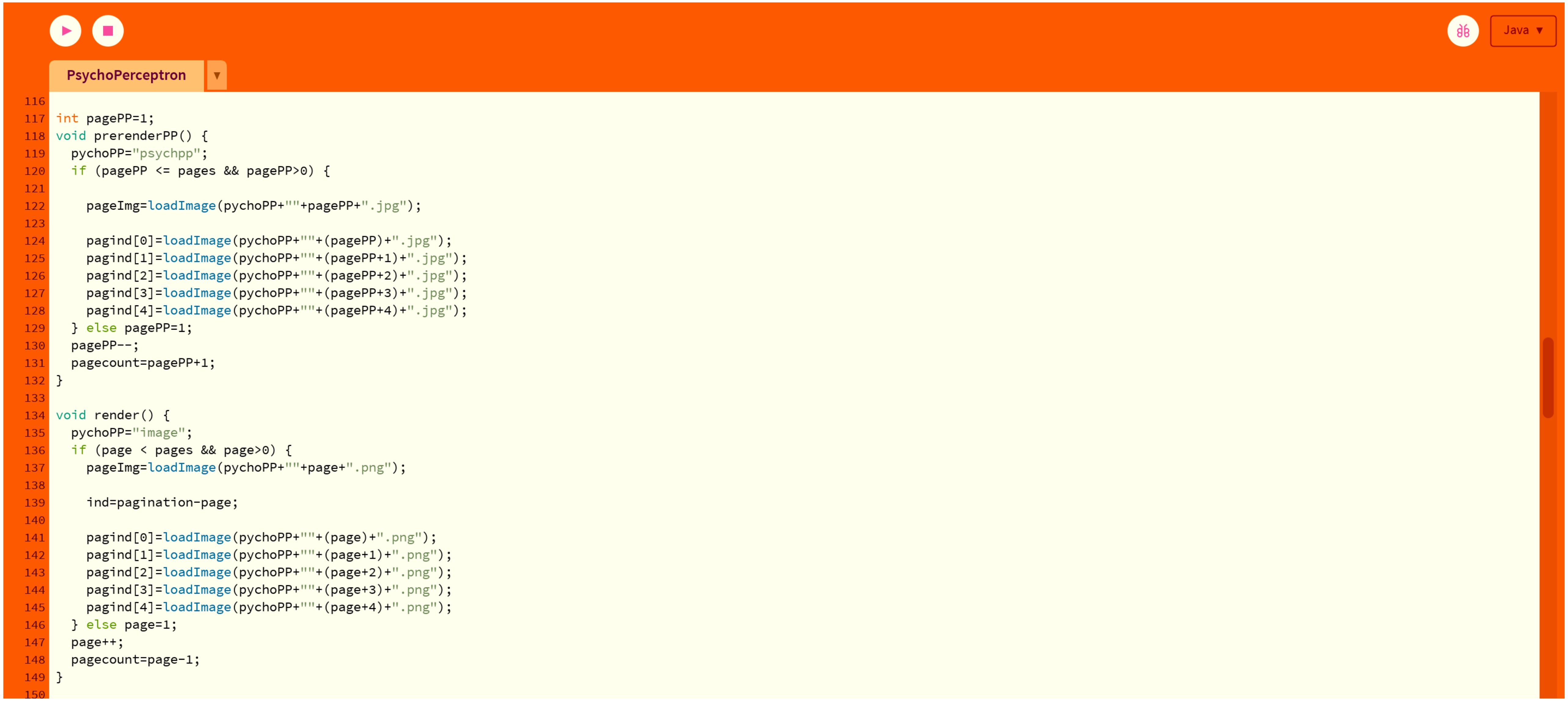
```
  } else if (key == 'A' || key =='a' ) {
    if (psycho) {
      page+=(int)random(1, 5);
      render();
    } else
    {
      pagePP+=(int)random(1, 5);
      renderPP();
    }
  } else if (key == 'S' || key =='s' ) {
    if (psycho) {
      page=1;
      render();
    } else {
      pagePP=1;
      renderPP();
    }
  }
}

```

Prerender Method:



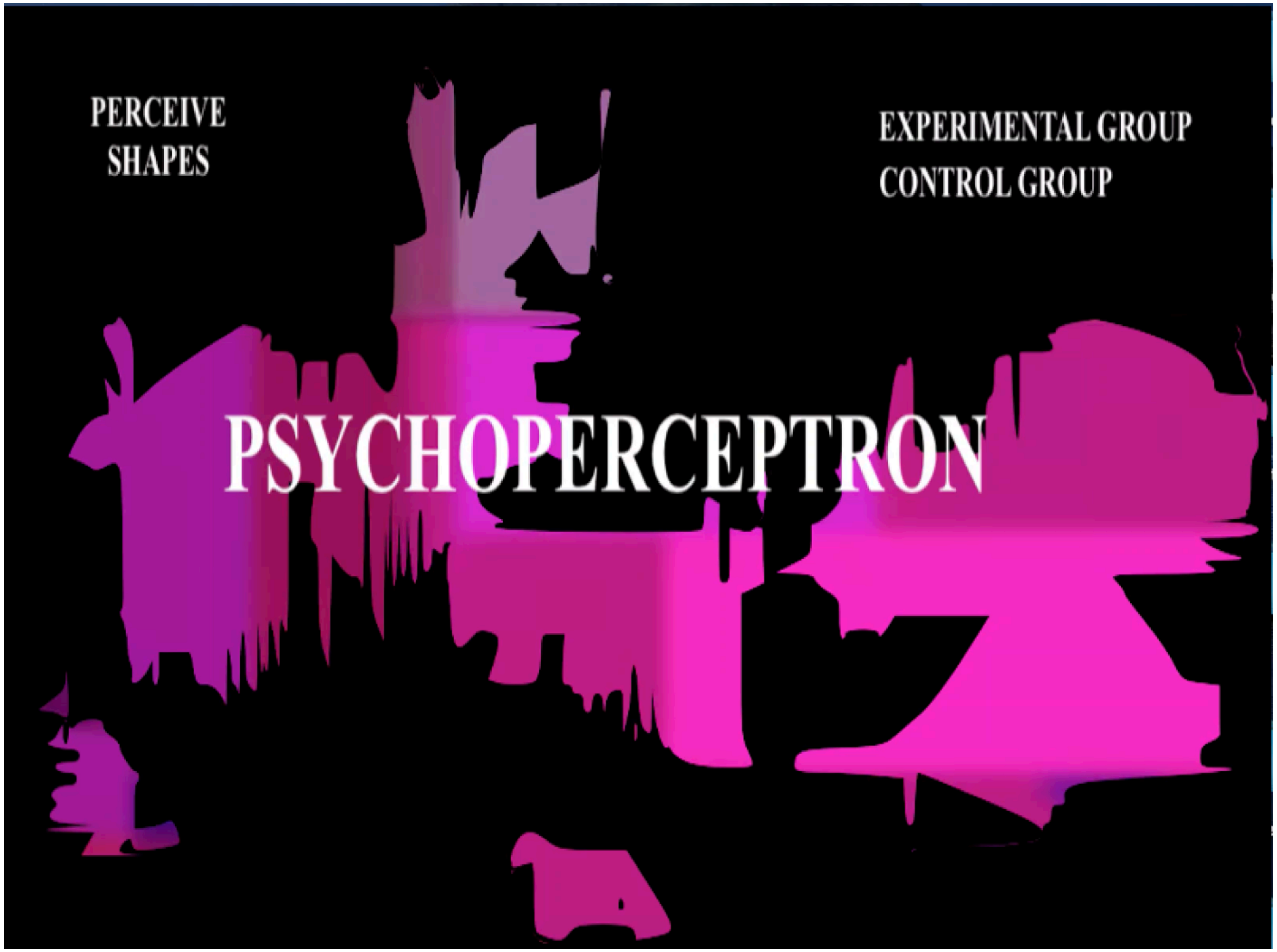
```
void prerender() {
  pychoPP="image";
  if (page>0 && page <= pages) {

    pageImg=loadImage(pychoPP+""+page+".png");

    pagind[0]=loadImage(pychoPP+""+(page)+".png");
    pagind[1]=loadImage(pychoPP+""+(page+1)+".png");
    pagind[2]=loadImage(pychoPP+""+(page+2)+".png");
    pagind[3]=loadImage(pychoPP+""+(page+3)+".png");
    pagind[4]=loadImage(pychoPP+""+(page+4)+".png");
  } else page=1;
  page--;
  pagecount=page+1;
}
```

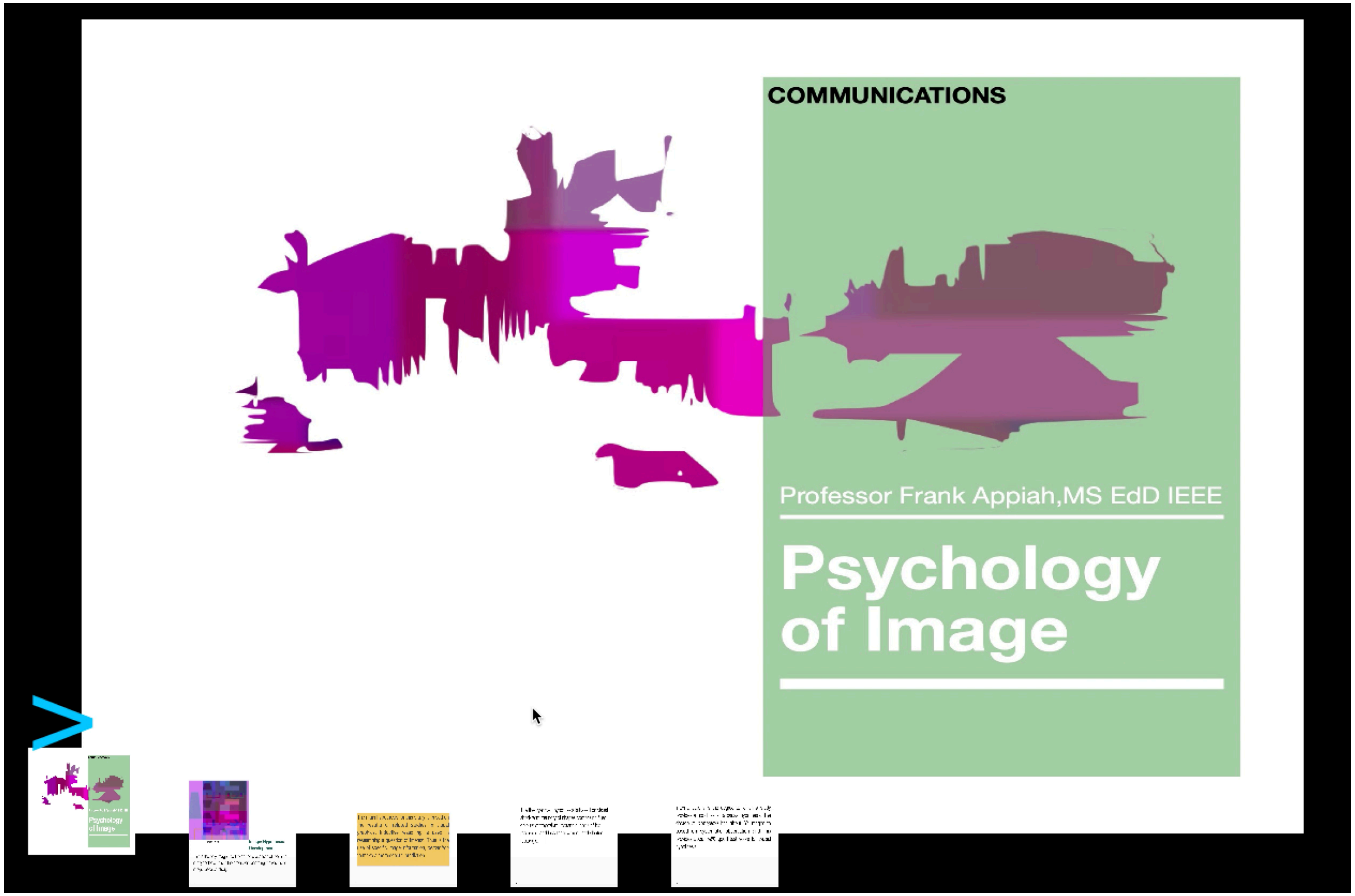
Render and PrerenderPP Method:



```
int pagePP=1;
void prerenderPP() {
  pychoPP="psychpp";
  if (pagePP <= pages && pagePP>0) {

    pageImg=loadImage(pychoPP+""+pagePP+".jpg");

    pagind[0]=loadImage(pychoPP+""+(pagePP)+".jpg");
    pagind[1]=loadImage(pychoPP+""+(pagePP+1)+".jpg");
    pagind[2]=loadImage(pychoPP+""+(pagePP+2)+".jpg");
    pagind[3]=loadImage(pychoPP+""+(pagePP+3)+".jpg");
    pagind[4]=loadImage(pychoPP+""+(pagePP+4)+".jpg");
  } else pagePP=1;
  pagePP--;
  pagecount=pagePP+1;
}

void render() {
  pychoPP="image";
  if (page < pages && page>0) {
    pageImg=loadImage(pychoPP+""+page+".png");

    ind=pagination-page;

    pagind[0]=loadImage(pychoPP+""+(page)+".png");
    pagind[1]=loadImage(pychoPP+""+(page+1)+".png");
    pagind[2]=loadImage(pychoPP+""+(page+2)+".png");
    pagind[3]=loadImage(pychoPP+""+(page+3)+".png");
    pagind[4]=loadImage(pychoPP+""+(page+4)+".png");
  } else page=1;
  page++;
  pagecount=page-1;
}
```

Application Screen

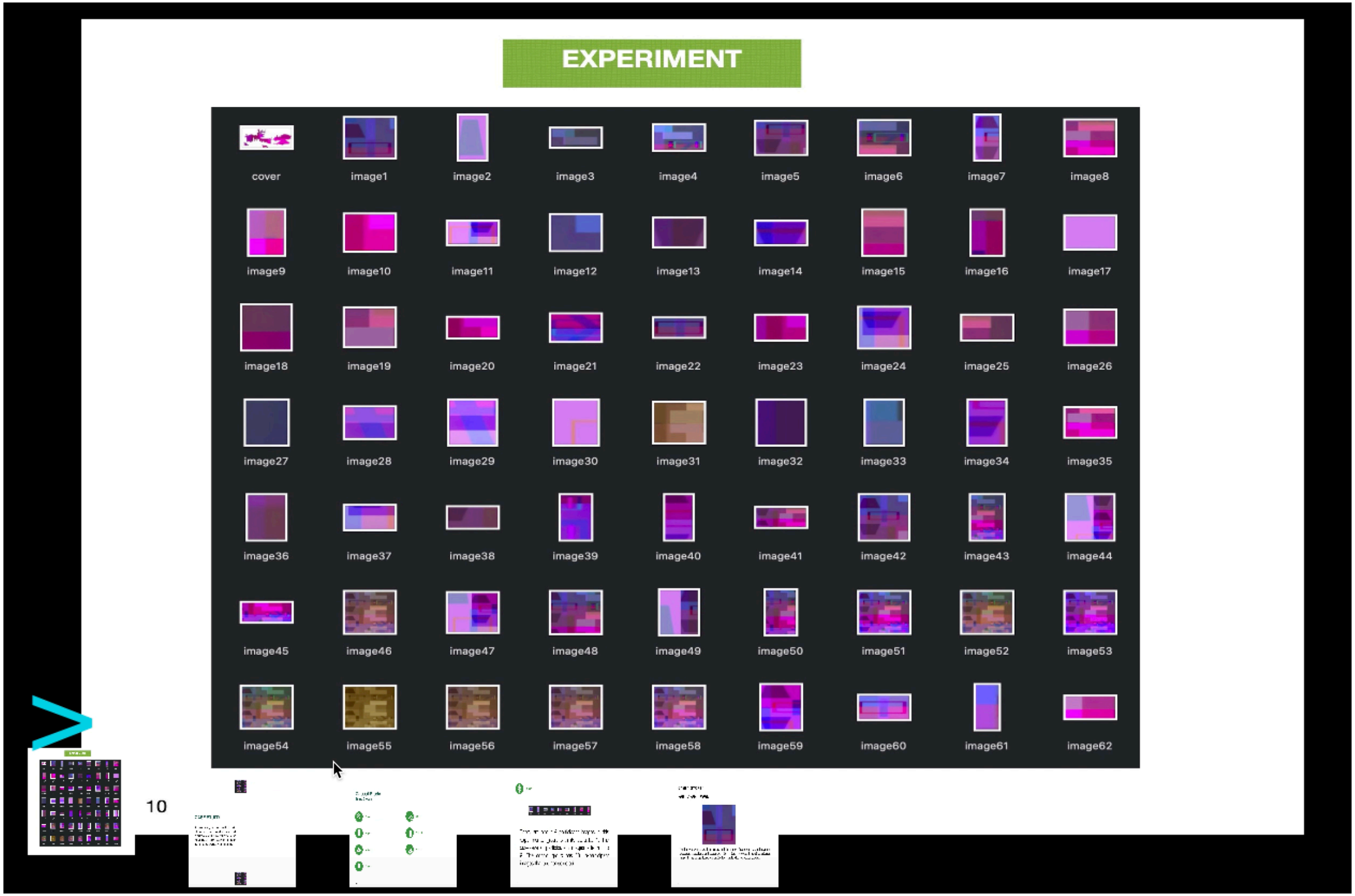

PERCEIVE
SHAPES
EXPERIMENTAL GROUP
CONTROL GROUP
PSYCHOPERCEPTRON



COMMUNICATIONS

Professor Frank Appiah,MS EdD IEEE

Psychology of Image



EXPERIMENT

cover
image1
image2
image3
image4
image5
image6
image7
image8
image9
image10
image11
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image16
image17
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image54
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image58
image59
image60
image61
image62
10

13
>

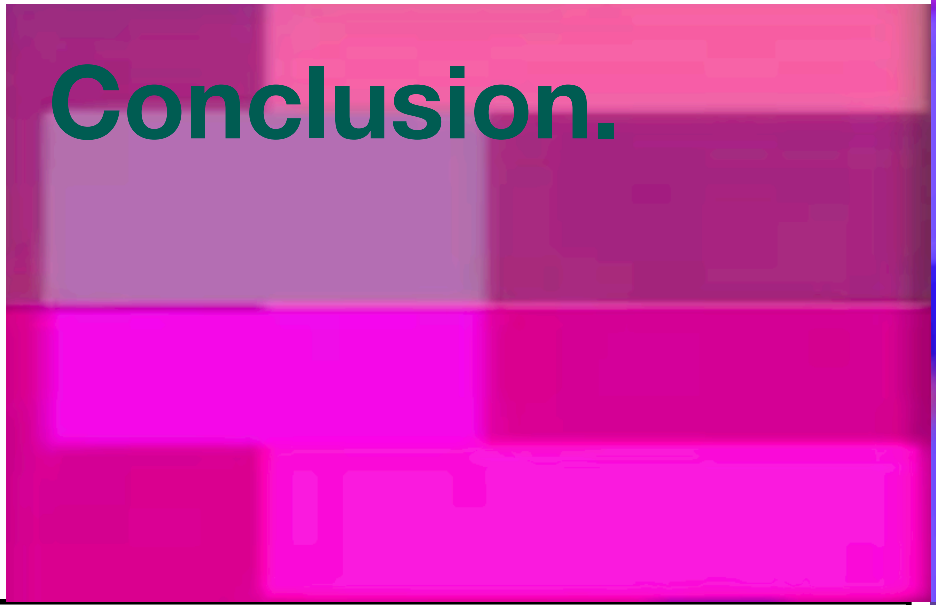
REFERENCES:

(1) Visual Perception of Shapes, Frank Appiah, King's Fellow work. 2021/22. 45pp.

(2) The Process of Research Psychology, Dawn M. McBride,Illinois State University , Sage Publishing, 2010.

(3) Processing IDE, www.processing.com, MIT License.

Conclusion.



This research study started with hypothesis along with the main hypothesis and theory-driven hypothesis. Then to degree of internal validity and systematic observation. We look at research design process, operational definition and further exploration of experiments. 7 variables of each with 9 participant images are used in the experimental groupings and a variable 53 un-participant images under control groupings. In section 2, main processing methods were describe thoroughly with screen shots of various used functions including rendering, perception and sound playing.